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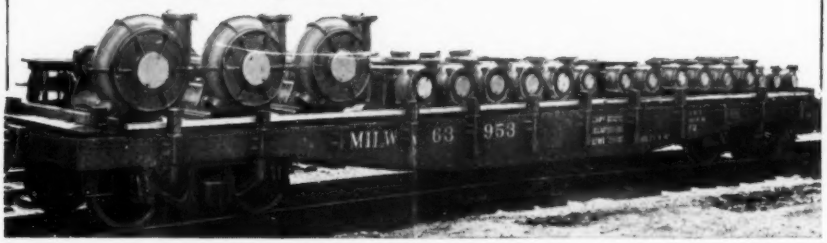

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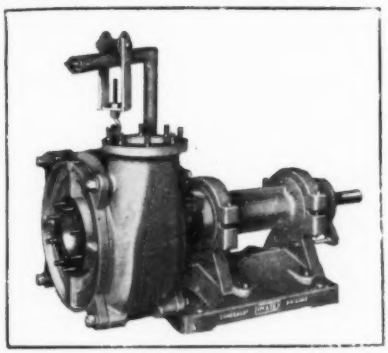

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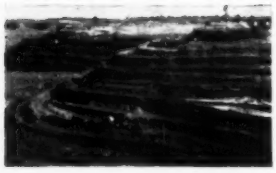

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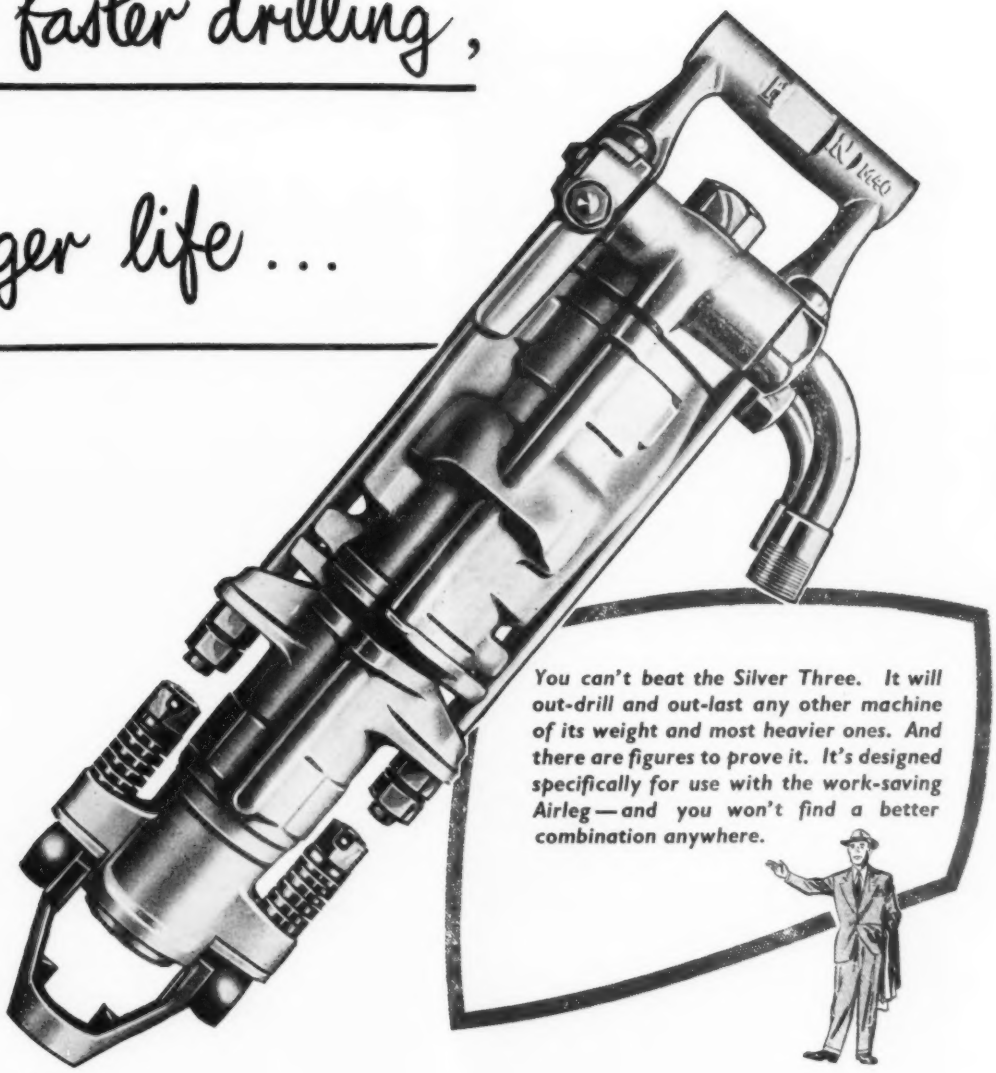

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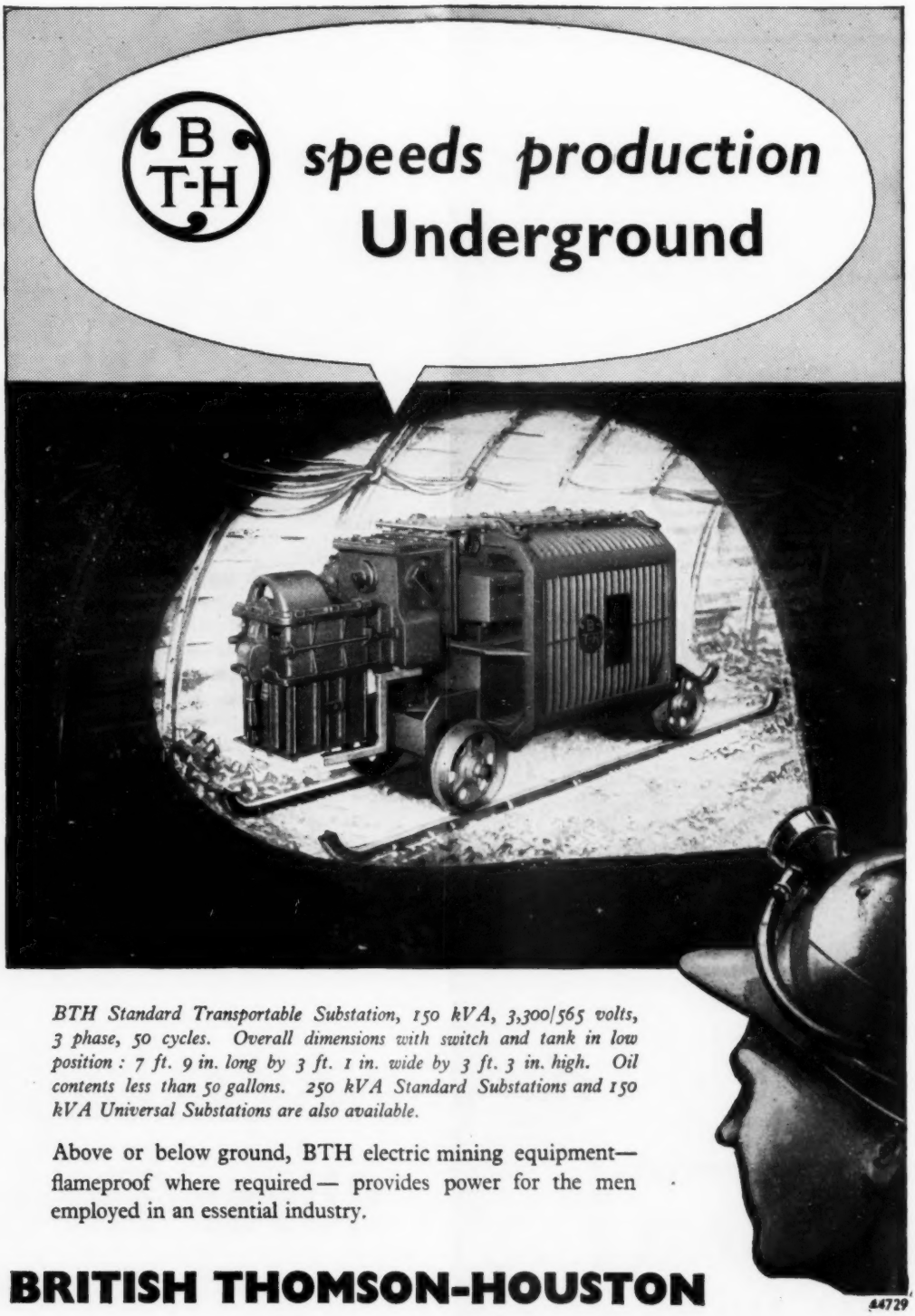

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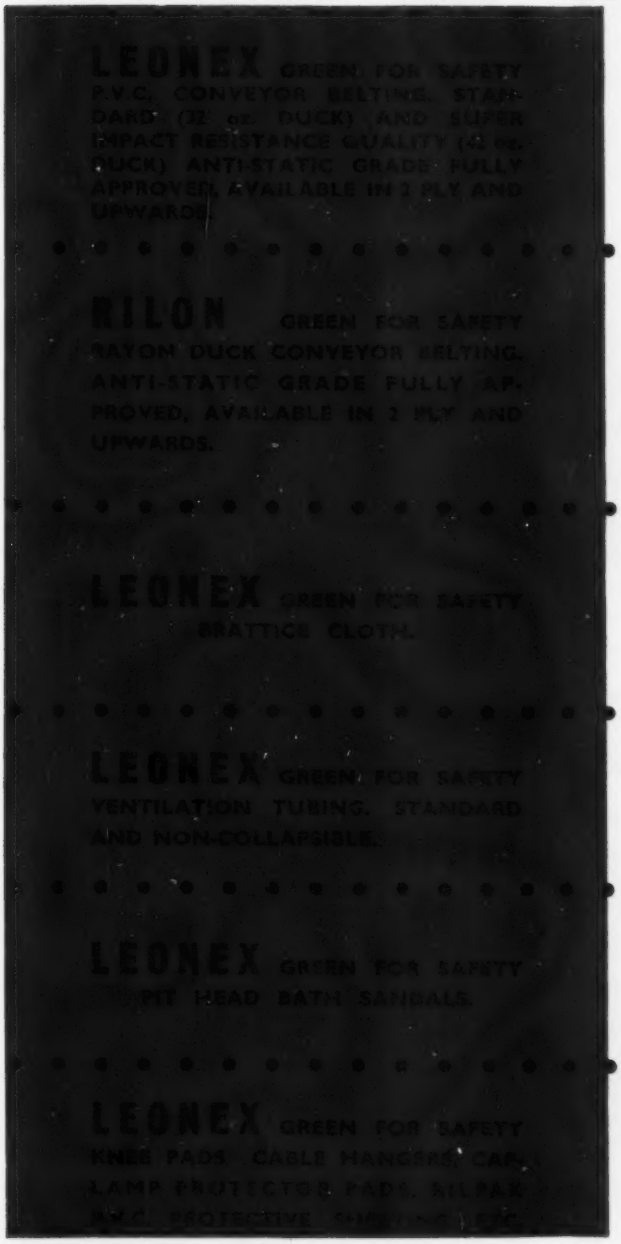
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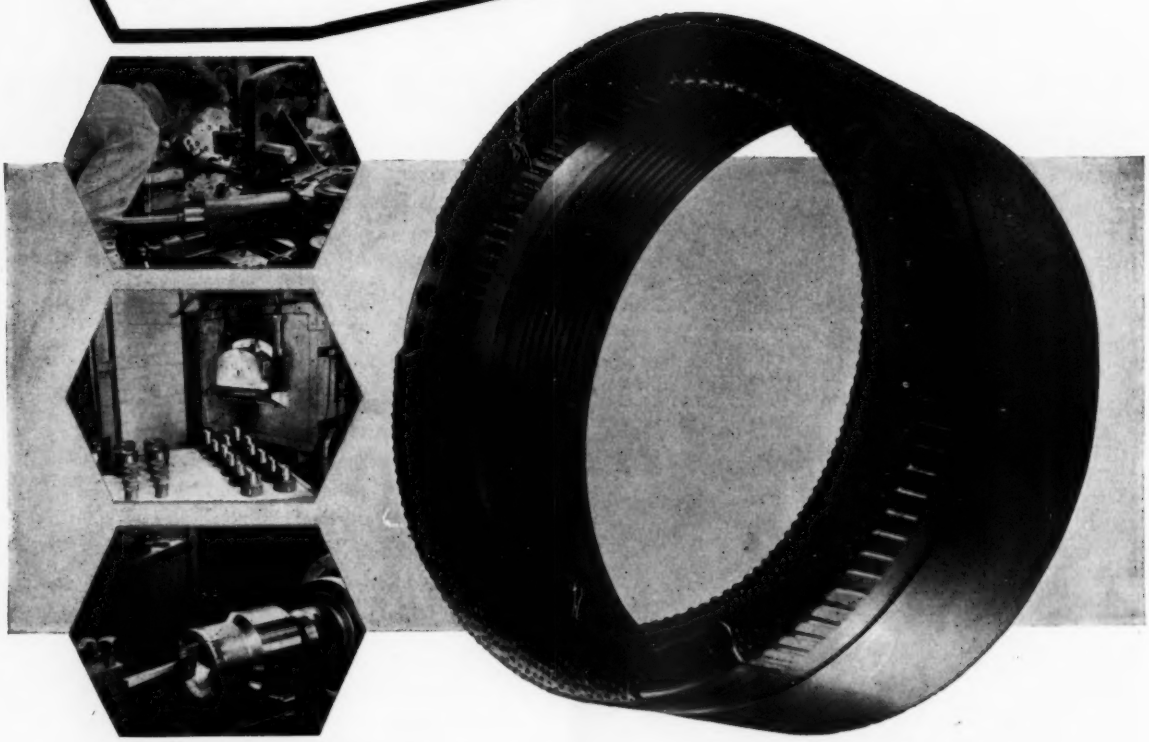

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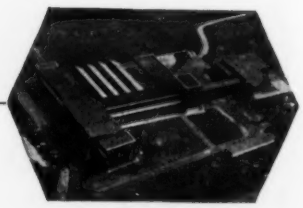

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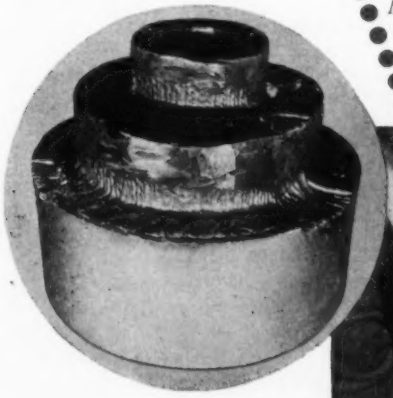

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The Mining Journal
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NOTES AND COMMENTS

Headaches for Asian Economists

A World Bank mission sent to India recently has expressed the view that the Second Five-Year Plan is "somewhat too ambitious," although the broad outline of India's development programmes is regarded as generally sound. This comment gives authoritative expression to the misgivings which many people have been reluctant to voice regarding the difficulties liable to arise from the present wave of five-year planning, if enthusiasm is allowed to outrun discretion when the so-called targets are fixed.

The climate of the post-war world is a heady one for the world's less highly developed nations. The past decade has witnessed the advent of self-government in India, Pakistan, Burma, Indonesia and other Eastern countries. In China the regime of Chiang Kai-shek with all that it stood for has given place to a vigorous and forward-looking government which, whatever the demerits of its ideological tenets, has unquestionably transformed the economic outlook of this ancient and ancestor-ridden country. In several of the more backward countries of Europe itself living standards are being raised by something in the nature of an industrial revolution.

Throughout the world industrialization is coming to be regarded as the Open Sesame to the material advantages enjoyed by the Western nations. The system of five-year planning, having proved spectacularly successful in the U.S.S.R., is now being adopted by a growing number of governments. It is hardly surprising that countries with limited experience of administration may be inclined to take an over-optimistic view of resources and limitations when framing five-year plans, due to a very natural desire to enjoy the maximum benefits of industrial progress with minimum delay.

However slender the national purse-strings, cost is seldom an insuperable obstacle to large-scale planning, for loans amounting to many million pounds can usually be obtained for projects which are inherently sound, not only from the World Bank but also from countries interested in supplying machinery and equipment or carrying out the work. Unfortunately, it happens almost inevitably that large engineering projects cost considerably more than the estimated sum.

Even if the five-year plan can be carried out without serious financial strain, the policy of trying to accomplish too much in too short a time is liable to bring unforeseen problems in the form of transport difficulties, shortages of labour and material, and the inflationary impact of an excessive capital programme on prices generally. In the U.S.S.R. itself the earlier five-year plans were by no means an unqualified success.

Although prominence is inevitably given to the expansion of mine production in every five-year plan, it is doubtful whether the interests of the mining industry are effectively served when the economy of a country is over-stretched. A long-term programme of mining development calls essentially for abundance of labour, stability of wages, and an internal transport system capable of handling increasing tonnages of minerals without congestion. There is the further consideration that hard-pressed Governments are less likely to resist the apparently insidious temptation to nationalize sound and profitable industries.

In a memorandum which has been placed before the Indian Lower House, the World Bank mission expressed its concern over the transport situation in India. It urged the Government to review its whole transport policy and programme with a view to maximizing transport by all available means —rail, roads, coastal shipping and inland waterway. The mission feels that significant results can be achieved in the Indian railways by the adoption during the Second Plan period of more efficient and up-to-date methods of operation. Emphasizing the importance of greater exports of textiles and cash crops to earn foreign exchange, it has asked the Government to give adequate incentives and resources to enable the private sector to make its contribution for the success of the Second Plan. It has also urged the Government to make a "determined effort" to enlist foreign capital and management for new ventures.

The mission realizes that the size of the plan must be such as to capture the popular imagination and to challenge the country to greater efforts. At the same time it feels the target must be sufficiently realistic to avoid the adverse psychological effects resulting from a market failure to accomplish them. "The plan seems too large," states the report, "in relation both to administrative and technical resources and to the financial resources likely to be available on even the most sanguine assumptions." But having now committed itself to the plan and the targets mentioned in it, the Government must henceforth concentrate on widening the administrative, technical and financial bottle-

necks on the one hand and prepare itself to make such timely adjustments in the programme as circumstances may require.

These friendly and constructive observations should be helpful not only to India but also to other Governments whose appetite for economic development may be leading them to bite off rather more than they can comfortably chew in such a short period as five years.

The B.S.I. in 1955

Many projects of importance to the mining industry are reviewed in the annual report of the British Standards Institution for the year ended March 31, 1956. The report's 260 pages show how wide and varied is the Institution's work and how it is keeping pace with the newest developments in industry.

Colliery requisites currently under consideration by the Engineering Division include cable glands and sealing boxes, 100 and 200 amp. bolted flame-proof interchangeable cable couplers and adaptors. The draft for 200 amp. cable couplers is being reviewed in the light of research carried out by the National Coal Board, which resulted in criticism and new proposals for revision. The resultant specification will affect the revision of B.S. 355, " Mining-type transformers," which is nearing completion.

In the field of components for underground conveyors, armoured flexible face conveyors are the first type of conveyor to be studied. Consideration is to be given *inter alia* to overall dimensions of the driving unit, driving motor flanges and baseplates, gearbox connections, chain size and quality, widths of conveyor pans and possibly connector details, to ensure interchangeability of conveyors of different makes.

Further tests on cements for use in jointing flameproof tubes of plastics material to metal holders in the production of flameproof lighting fittings have now shown three compounds which are expected to prove satisfactory. Tubes which have been assembled as a " press " fit on the ring have proved better able to withstand temperature variation. Final tests are now being made and experiments in methods of assembly are continuing. The draft for flameproof fittings incorporating plastics covers is in an advanced stage, awaiting solution of this problem.

An interesting development has occurred in regard to B.S. 889, " Flameproof electric lighting fittings ". Research has led to a proposal, now being investigated, that satisfactory diffusion of the light source, to avoid glare, can be obtained by internal acid treatment of the glass. It is claimed that acid etching has been achieved on a production basis without detrimental effect on the strength or other physical properties of the glass.

The revision of B.S. 708, covering trailing cables for mining purposes, will be published shortly but may require amendment later, in regard to requirements for vulcanized rubber insulation and sheath, when a new standard now being prepared for these is complete.

Work on the revision of the methods of crushing vermiculite has continued at the mines in South Africa and Southern Rhodesia. The manufacturers of exfoliated vermiculite are carrying out co-ordinated tests on the raw material now being received in the U.K. It was expected that the results of the changed procedure at the mines, leading to better grading of the ore, would be available during the year, but it has been found that tests on the imported ore must continue before there is enough information to provide the basis for a British Standard for the final product.

Although no major programme of standards in the field of nuclear energy has yet been developed, a number of aspects are being studied. Preparation of a glossary of terms and of a standard for isotope holders and for barytes as a concrete aggregate (where protection is needed in a limited space) has continued. A new committee is being set up to evolve standard methods for protecting persons engaged on work using radioactive materials.

There is also much to interest the mining industry in the work of the International Organization (ISO), which is surveyed in the B.S.I. report.

Since the meeting of the Mica Committee in October, 1954, when " Methods of grading muscovite mica blocks, thins and condenser films " and " Visual classification of muscovite mica " were adopted as draft ISO recommendations, discussion on these documents and on phlogopite mica has continued by correspondence. The U.K. Committee has circulated its proposals on master standard samples (recommending abandonment of this project) and on non-ruby mica.

The setting up of a committee of mining (Secretariat, Germany) has now been approved by the ISO Council. When the proposal was first put forward it appeared to involve overlapping with other ISO committees, and doubts were felt about its usefulness. The scope of the committee has now been defined so as to include not only surveying, mine supports, mining equipment (machines such as cutting machines, shaft sinking devices, drilling machines), other safety equipment and installations, and flameproof material (so far as this is not covered by the International Electrotechnical Commission). The U.K. has decided to be a member of the committee.

Growing support for the work of the British Standards Institution is again reported. The number of subscribing members—commercial firms, trade associations and professional bodies — rose to the record figure of 8,650—more than 4 per cent higher than the figure for the previous financial year.

The Titanium Situation in the U.S.

A new evaluation of the U.S. titanium programme will made by ODM. soon after September 1, by which date revised mobilization requirement figures will have been received from the Department of Defence. Titanium production in the U.S. has been running substantially ahead of consumption during the past year. Statistics released by the U.S. Department of Interior show that for the last six months of 1955 and the first six months of 1956, domestic production totalled 8,803 s.tons of titanium sponge and imports for consumption amounted to a further 901 tons. U.S. consumption for the same period was 6,656 tons and most of the surplus is going into Government inventory. In addition to the 901 tons of sponge imported for use during the past year, there has accumulated in bonded warehouses in the U.S. during the year over 700 tons of Japanese titanium waiting for a market.

The announcement that production was outrunning consumption followed close on the news that National Lead Company and Alleghany Ludlum Steel Corporation, joint owners of the Titanium Metals Corporation of America, had decided upon a further expansion of the titanium's firm's facilities. Output of titanium sponge will be raised to 25 tons daily from 16.7 and of titanium ingots to 30 tons daily from 17 tons. National Lead and Allegheny Ludlum Steel announced last March that they would expand daily sponge production to 16.7 tons from an original ten tons. The two programmes, which are scheduled for completion during the coming year, will cost an estimated $15,000,000. The increased facilities reflect the growing demand for the metal, the announcement added.

At this early stage in the development of titanium as a

commercial metal, considerable fluctuations would normally be expected in the relationship between supply and demand, with demand tending to trail behind supply until production costs had been sufficiently reduced and fabricating facilities had been established on a sufficient scale. In the case of titanium the interaction of the various factors governing the progress of a new metal has been distorted by Government measures to accelerate production and development of a material of critical importance to military programmes. Clearly the stage has now been reached when the continued expansion of the titanium industry will be governed to an increasing extent by the growth of commercial demand, which in turn will depend very largely on the price of primary metal.

Since March 31, 1954, the price of titanium sponge in the U.S. has fallen from $5 a lb. for grade A-1 to $3 and from $5 to $2.70 for grade A-2. In Britain I.C.I. have brought down the price of their raw titanium to about 21s. a lb., which is below $3. A research and development firm in the U.S., Horizons Incorporated, claims to have developed in the laboratory an electrolytic process for producing titanium at significantly less cost than by the Kroll process. This company has now been awarded a contract by the U.S. Navy covering the commercial development of its process, which is a modification of the original fused salt electrolysis method and produces titanium in the form of coarse granules. Another development which might favourably affect production costs is the discovery that argon can be substituted for helium in certain steps of the titanium production process, as reported by the U.S. Bureau of Mines. This would extend domestic supplies of helium, which is used in large amounts by the A.E.C., the Defence Department and by private industry, but experiments with argon and helium have not yet determined the relative costs of both gases.

It is improbable that the present situation of apparent over-supply will lead to curtailment of the expansion projects currently in hand or shake the confidence of the titanium industry in its future. For instance, Mallory Sharon Titanium Corporation has just put into operation the first of five new titanium melting furnaces as part of a $4,500,000 expansion programme that will double the facility's present capacity by 1957. When the last of the new furnaces is put into operation during the first quarter of 1957, melting capacity will be 500 tons a month.

The long-term outlook for this young metal has been further improved by the news that workers at the Battelle Memorial Institute for Wright Air Development Centre have successfully applied methods comparable to those used for steel to the successful extrusion of titanium.

South Africa

(From Our Own Correspondent)

With complete operating statistics for the gold mining industry covering the first half of the year, it is possible to assess how things have changed compared with the first six months of 1955. Looked at broadly, there has been a great measure of progress both in the fields of gold and uranium as reflected in the following figures:

Tons milled 33,680,100 (32,507,000) gold recovered, 7,509,427 oz. (6,869,470); to which must be added the output of miscellaneous producers which brings the figure to 7,757,670 oz. (7,119,022); value £94,006,012 (£86,576,995); working costs £70,986,917 (£65,089,599); working profit, £23,019,095 (£21,487,400); uranium and acid profits, £11,538,950 (£7,444,371); total estimated working profit, £34,558,045 (£28,931,771).

Much of this improvement, of course, flows from new mines coming into production and from increasing outputs of the younger mines. At the same time, the contribution of a number of the older mines increased due, for the most part, to the consistently higher level of Native labour supplies. This added not only to the physical amount of gold produced but had a beneficial effect on working costs. These stood at 42s. 2d. per ton milled and 189s. 1d. per oz. produced, against 40s. 1d. and 189s. 6d. respectively.

Direct comparisons of these figures is a sticky business. In the first place, the same producers were not operating. Secondly, allowance should be made when considering the cost per ton figure for the weighting resulting from reef sorting which — as has been pointed out on previous occasions—produces a completely unrealistic cost figure. At the same time, the cost per oz., figure, though probably a more accurate criterion is not completely comparable on account of the first qualification made above and probably that any cost of production for a mine in the initial stages of its career cannot be regarded as normal. It would, therefore, seem to be fair to suggest that there has been no major change either way in working costs for the industry as a whole. One can go further, however. This halting of the upward spiralling in costs is in very large measure due to factors within the industry itself and not from any major change in the country's economic structure as a whole. Although inflation did slow down to some extent over the year, it was taking place as reflected in the various price indices. The improved supply of Native labour has undoubtedly helped the mines in this task, but one cannot but help gain the impression that efforts to increase efficiency and productivity are meeting with a measure of success.

PROBLEMS OF LOW-GRADE MINES

At the same time, the old low-grade mines are still very much up against it. For the first six months of last year there were 11 properties operating with a working profit of less than 2s. 6d. per ton milled. This year the figure has risen to 15s. What solution there is to this problem—apart from a fortuitous increase in the price of gold which seems most unlikely—is still to be found, if one exists. The only reasonable one would seem to be relief from certain direct charges such as silicosis liabilities, railway charges or the like.

Uraniums and acid earnings are certainly impressive and this undertaking is certainly profitable. The value of exports of prescribed material for the half-year are not yet available, but they should be around £19,000,000. As shown above the estimated profit, before allowing for loan repayments was over £11,500,000. After making a generous allowance for acid profits, uranium recovery must be yielding around 100 per cent gross profit. As has been pointed out—it is almost as profitable an enterprise as copper mining in Northern Rhodesia.

One of the last remaining veils surrounding uranium has been lifted with the official release of the news that ion exchange plays a vital part in the final extraction process, though this is hardly " hot news " to anyone here whose ear has been anywhere near to the ground in the mining world. The only embargo that remains is on grade and price. This information is likely to remain on the secret list for a very long time—even though it is lifted in other countries. When the original contracts were concluded it looked as if uranium was a rare mineral indeed and it is known that a relatvely high price was fixed. What it is actually is anybody's guess, but it is considerably in excess of eight dollars a lb.—the U.S. domestic price. Reports have it that any disclosure of the price paid here, would have most serious repercussions in the domestic political field in the U.S., in consequence it is doubtful whether any relaxation on publication of this information is likely to come about until either the world price catches up on it or after the expiration of the contract periods.

Mining Developments in Asia and the Far East

The ten-year period following the second world war was marked by intensive and extensive mineral development in Asia and the Far East. The main features of post-war progress are reviewed by the United Nations Economic Commission for Asia and the Far East in an appendix to its report for 1954-55, from which this survey is extracted.

Mineral production has provided a very significant revenue for the countries of the region and has also been an important source of foreign exchange. In India the value of mineral production, excluding oil, has been over Rs.1,000,000,000 (more than U.S.$200,000,000) annually in recent years, while the total value of mineral exports has been over Rs.400,000,000 a year. In the Philippines, total post-war production had risen by 1954 to P.760,000,000, or the equivalent to U.S.$380,000,000. In South Korea, during the latter part of this post-war period, between 47 and 76 per cent of the total value of exports came from minerals. In British Territories in Borneo, mineral exports in 1954 alone were worth over $10,000,000 and accounted for more than 60 per cent of the total exports.

Parallel to this increase in the revenue from mineral production, there has been much investment in mineral investigation and development. In the Philippines, as of 1954, capital investment in the mining industry reached about P.200,000,000 (U.S.$100,000,000). In Pakistan, by the end of 1954, approximately Rs.109,000,000 had been invested in the industry. In India the total foreign investment in the three new oil refineries alone amounted to Rs.500,000,000 (over U.S.$100,000,000).

Increasing activities have also been witnessed in the mineral trade. While the mineral exports from Mainland China went chiefly to countries of Eastern Europe, in the trade agreements between Mainland China and several countries of the region, coal, non-ferrous metals and mineral products have been listed prominently among the items available for export. Mineral exports from other countries of the region went principally to the U.S. and to Japan. The greater part of the tin, ilmenite, mica, manganese and chrome production of the region was exported to the U.S.; while Japan imported coal from India and China; iron ore from Malaya, the Philippines, Hong Kong and India; manganese, copper and chrome ore from the Philippines; and salt from India, Taiwan and Thailand. In fact, during the latter part of the post-war period, the increasing activities of Japan in endeavouring to obtain mineral raw materials from South-East Asia were much in evidence.

EXPLORATION AND PROSPECTING

Realizing that systematic geological surveys and proper prospecting are indispensable pre-requisites for mineral development, all governments have been paying increasing attention to this need. Mainland China's all-out effort has included the creation of a new Ministry of Geology under the central government, the convening of national conferences for the planning of geological work in co-ordination with national economic development, the establishment of training schools for technicians, and an increase in the number of field parties.

In India, the Geological Survey has been expanded, a Bureau of Mines created, and a Mine Research Station will be established shortly. In Pakistan, the Geological Survey Department was formed shortly after partition and about 416,000 km. have been mapped geologically. In British Territories in Borneo, the first geological survey was undertaken in 1949 and a geological map on a scale of 1 : 1,000,000 has been completed. In Burma a Mineral Resources Development Corporation has been established. In Afganistan a Geological Survey has been formed, and in Nepal the first detailed geological survey of the country is in progress. With the exception of such countries as Malaya and Korea, where internal disturbances prevented or limited prospecting activities, all countries of the region have undertaken large-scale geological mapping and mineral exploration programmes.

LEGISLATION

In the development plans formulated by governments since the war, considerable attention has been paid to the development of indigenous resources and new legislation has been formulated to guide mining development. While the countries of the region are generally in favour of the development of mineral resources under their own auspices, they have in many cases permitted foreign investment when it was considered necessary. In Afganistan a foreign investment law, the first of its kind in the country, was passed to encourage foreign investment in mining. In Burma, the government participated in the two major mining companies in the form of "joint venture". Hereafter the natural resources of the country may be developed by private enterprises in partnership with the government, or under contract to the government. In Taiwan new regulations were passed to encourage foreign investment. In Indonesia an important mining policy decision was implemented when the government took over the operational management of major tin mines. The government also owns and operates the major coal mines in the country. In Pakistan, with the object of attracting new companies interested in prospecting for oil, the government has decided to make certain concessions in taxation laws and also in the rules governing the grant of concessions for petroleum. In Thailand, the government considered that mining concessions could be granted to foreigners only if development could not be undertaken with locally available capital and technical knowledge.

Another interesting feature of post-war development is the increasing assistance from foreign countries, either through bilateral agreements or through international organizations. In Afghanistan, for instance, technical and material assistance in the development of mineral resources has been provided by the U.S. aid programme, the Technorpromexport of the Soviet government, and through the United Nations expanded technical assistance programme. In Pakistan, a complete aerial survey of the country was undertaken by Canadian experts through the Colombo Plan. The Commonwealth Development Finance Corporation in London invested the rupee equivalent of £1,000,000 in the Sui Gas Transmission Co. Ltd. in Pakistan. Similar assistance has been utilized by most countries of the region in varying degree.

OIL AND GAS

The rehabilitation of oilfields was completed shortly after the end of the war and prospecting for new fields has been carried out. Increasing crude oil production has been registered in all producing countries. The most significant progress, however, has been in the expansion and establishment of oil refineries. There are several reasons for this development. In the first place, consumption of oil and oil products has increased to such an extent as to encourage the building of refineries. Secondly, the shipping of a single product, crude oil, instead of various refined products, will

make it possible to use bigger tankers and consequently to lower transport costs. Thirdly, Asian countries have an urgent desire to save foreign exchange. Fourthly, they will be less dependent on outside sources of supply. Finally, the establishment of refineries in the countries will give more opportunity to train local staff, which will lead to increased employment.

Natural gas production in the region has also shown a general increase, the most significant development during the post-war period being the discovery of the Sui deposit in Baluchistan. As is generally known, Pakistan is deficient in solid fuels and normally about 1,500,000 tons of coal have to be imported annually. The Sui gasfield, when fully developed, is expected to yield close to 3,000,000 m. a day for 60 years, equivalent in effective heating value to 1,600,000 tons of coal a year.

COAL PRODUCTION

With the exceptions of Korea, Malaya and the Philippines, the coal output of the region as a whole has steadily increased. In the case of Korea, the recovery of the coal industry was interrupted by the outbreak of hostilities in 1950. In Malaya production declined as demand fell in the face of competition from fuel oil. In the Philippines coal production has been small; most of the machinery used nowadays is run by hydroelectric power, oil or petrol and bunker, and the demand for domestic coal is very limited.

Mainland China and India have ambitious plans to develop their coal mines. Coal production in India rose from about 30,000,000 tons in 1945 to over 37,000,000 tons in 1954. By 1956 it is planned to have an annual production of 60,000,000 tons. The increase in the coal production of Mainland China has been spectacular. In 1954 output reached 83,300,000 tons, against 41,000,000 tons in 1945. The production target under the First Five Year Plan is 113,000,000 tons by 1957. In 1948, Japan supplanted India as the region's largest coal producer. During the past three years, however, Japanese coal production has declined, and due to the unfavourable condition of coal seams this tendency is unlikely to be reversed. In the coming years China and India will be the leading producers of the region.

Another significant development is the opening of deposits in Burma and Thailand, which produced no coal before the war. Lignite production in Thailand has already reached 6,000 tons per month, while the Kalewa coal project, when completed, will enable Burma to have 1,000 tons of domestic coal per day.

IRON ORE AND NON-FERROUS METALS

Post-war discoveries have increased India's iron ore reserves (measured, indicated and inferred) to 21,000,000,000 tons, of which 17,500,000,000 tons have an iron content above 50 per cent. In 1952, the iron ore reserve of Mainland China was estimated to be more than six times greater than the pre-war estimate. Increasing output has been recorded in all producing countries.

While iron ores produced in Mainland China, India and Japan have been used essentially in the domestic iron and steel industries of these countries, those produced in Malaya, Hong Kong and the Philippines were mainly for export to Japan. India's iron ore production was higher than domestic requirements and a substantial amount was exported. Steel production—which has also increased—is confined to India, Mainland China and Japan, which account for 99.7 per cent of the region's present annual total of about 13,000,000 tons. Even if the planned production is all realized, output will amount only to about 24,000,000 tons, of which 93.3 per cent will still be from these three countries.

South Korea has become the leading tungsten ore producer of the region, excluding Mainland China which, with output believed to be currently about 14,000 tons, is the largest producer in the world. Other producers are Thailand, Burma and Japan. Production in most of these countries reached its post-war peak either in 1952 or 1953. There has since been a slight decrease in output, due to reduced demand and lower prices.

Manganese ore has come mainly from India, Japan and the Philippines, with India as the leading producer and exporter. Production rose steadily until 1953, when prices of manganese ore started to ease. Towards the middle of 1954, with consumers in most markets well stocked, the open market became very dull. In 1954, lower-grade ores were almost unsaleable in the U.S. Demand increased slightly by the end of the year and prices began to improve.

Chrome ore has followed a similar trend, though to a less extent. The Philippines retained its position as the region's largest producer, while Pakistan ore continued to command a favourable price in the world market.

NON-FERROUS METALS

Despite sharp fluctuations in prices, tin production in the region has steadily increased. This was due to the fact that most of the output was obtained from well-mechanized large companies and production did not necessarily rise or fall in proportion to varying prices.

The region's contribution to the world's copper, lead and zinc production has been small. Among the few producing countries are the Philippines, Japan and Burma, all of which have recorded a steady increase since the end of the war.

Aluminium production has been confined to Japan, Taiwan and India, while titanium manufacture has begun in Japan. Aluminium production has risen in all three countries, the most spectacular increase being in Japan where output rose from just over 3,000 tons in 1946 to 53,000 tons in 1954. Malaya is now the leading producer of bauxite ore, followed by Indonesia and India, while India remains the leading producer and exporter of ilmenite ore.

The gold mining industry has experienced difficult times in recent years. For one thing, gold is not so much sought after in the region as previously; there has been a marked slowing down in gold disappearance, which reflects a decline in demand. Though the free market has been active there was a fall in price, which was general elsewhere in the world. The Philippines remain the leading gold producer of the region, with an output of 419,112 f.oz. in 1955. Other producers are China (Taiwan), Malaya, British Territories in Borneo, and India.

COLUMBITE AND RADIOACTIVE MINERALS

In response to recent demand, columbite deposits have been developed in Malaya and South Korea and attention has been paid to radioactive minerals. In Ceylon a monazite processing plant has been installed 30 miles south of Colombo on the west coast of the island. In China (Taiwan), the government is conducting tests on the concentration and separation of monazite-bearing sands which occur along the west coast and in river beds in the south-western part of the island. A nation-wide survey has been undertaken by India's Atomic Energy Commission. Prospecting for radioactive minerals has also been carried out in Japan and the Philippines.

URANIUM RECOVERY—II

Uranium Extraction from Radium Hill Ores

The first portion of the following article dealt with the ion exchange technique and South African practice in uranium extraction. In this issue the use of the ion exchange method in the extraction of uranium from the ores of Radium Hill, South Australia, is fully described.

The mineral carrying the uranium at Radium Hill is davidite, which is highly refractory. Members of a C.D.A. technical mission in Australia suggested that a sulphuric acid-ion exchange process should be seriously considered for the extraction of uranium from Radium Hill concentrates. Since the proposed method promised to be very much cheaper, it was decided to abandon the previous nitric acid process and concentrate solely on the development of an ion exchange method. By October, 1953, research and development had reached the stage where it was possible to proceed actively with the construction of the Port Pirie chemical treatment plant.

The concentrates produced at Radium Hill have a relatively high uranium value compared with most uranium ores, due to the fact that metallurgical processing can be undertaken to beneficiate the ore as mined. They require treatment with strong acid over a prolonged period at boiling point to recover the uranium into solution. These concentrates are dispatched at Port Pirie. They pass into rubber-lined agitator tanks and are mixed with water to produce a slurry containing about 60 per cent solids. The slurry is pumped to the digestors in the leaching plant.

THE LEACHING PROCESS

Leaching is carried out in batches. Concentrate slurry and acid are charged into the digestor and steam is blown into the slurry to maintain the boiling conditions for 10 hours. During this time approximately 15-20 per cent of the concentrate is dissolved, including the uranium.

The leached pulp is discharged to pulp-holding tanks, fabricated from mild steel and lead lined, which are fitted with stainless-steel agitators. These tanks are partially filled with water or liquors from other sections of the plant returned for re-treatment. The leached pulp is discharged to the pulp-holding tanks and stirred vigorously. In the course of leaching the sulphuric acid strength drops from approximately 40 to 2.5 per cent, and is further reduced by the addition of lime. The pulp is discharged to the thickener-supply tank in the counter-current decantation section. Here the pregnant liquor is separated from the solids, the latter being washed by continuous decantation to recover all the uranium in solution.

The pulp delivered to the thickener-supply tank is agitated by a stainless-steel propellor-type agitator. It contains approximately 15 per cent solids and is pumped to the first thickener tank. The cloudy pregnant liquor is discharged into a tank before pumping to the extraction plant storage.

The cloudy pregnant liquor is pumped to a pre-coat vacuum drum filter where the liquor is clarified. The filter drum is fitted with a plastic filter-cloth and a layer of filtering medium, which acts as a filter bed, is fed on to the filter drum to a depth of 2 in. The clear liquor is discharged through the centre of the drum and pumped to a storage tank. The fine particles collecting on the surface of the filter medium tend to clog the surface, preventing efficient filtration. They are, therefore, removed by an advancing knife, thus providing a clean surface for subsequent filtration.

The clarified liquor is pumped from the stock tank to the ion exchange plant. Two units have been installed, each consisting of four rubber-lined tanks 12 ft. high x 7 ft. dia. in which synthetic-resin beads are packed. The pregnant liquor is pumped into the ion exchange columns and is fed from the top of one column, led from the bottom into the second tank, taken from the bottom of the second into a third tank, and finally discharged from the third tank to waste. A sequence of flushing and washing cycles is carried out, followed by the recovery of the uranium from the resin by passing a solution of sodium chloride (common salt) and sulphuric acid down the resin bed. The uranium is attracted back into this solution, the resin being regenerated for a subsequent cycle.

In the precipitation section the eluate is run continuously through a three-stage cascade-type continuous precipitation unit. Lime is added under carefully controlled conditions to reduce the acidity. The resulting pulp is pumped to a rubber-lined thickener. The underflow, consisting of a concentrated iron hydroxide pulp, is pumped by a diaphragm pump to a small stainless-steel vacuum-drum filter. The iron hydroxide solid is filtered off and slurried with water before being pumped to a tank and thence to the leaching plant for the recovery of uranium held in the solids. The overflow from the thickener is combined with the filtered liquor from the vacuum filter and pumped to a three-stage cascade continuous precipitation unit. The liquid is fed continuously through this unit and a magnesia slurry is added to reduce the acidity and precipitate the uranium as a relatively pure uranium salt.

The outgoing pulp containing uranium salts is pumped to the rubber-lined uranium thickener. The underflow, consisting of a heavy pulp of the uranium salts, is pumped by a small diaphragm pump to a continuous vacuum-drum filter where the uranium salts are filtered and washed. On being discharged from the drum filter the pulp is slurried with water and pumped to a final vacuum-drum filter.

FINAL RECOVERY

The overflow from the thickener is mixed with the filtered liquor from both filters and pumped to a small stainless-steel pre-coat vacuum-drum filter which clarifies the liquor to recover the small quantity of uranium passing through the final product vacuum filter. The filter cake from this filter is re-slurried and pumped to the leaching plant for recovery of uranium.

The moist filter-cake of uranium salts from the final vacuum-drum filter is discharged on to the continuous rubber belt and is carried to the dryer. This unit is a tunnel dryer of the hot-air blast type, through which the material is carried on a continuous stainless-steel belt. The outgoing air passes through an electrostatic precipitation unit to remove uranium dust before discharging to atmosphere.

The moist uranium salts discharge from the rubber conveyor-belt into an extruder which extrudes the moist material in small rods on to the stainless-steel belt. After being subjected to a temperature of approximately 500 deg. F., the material is fed into a hopper and carried by a screw conveyor to a chute discharging the product into 44-gal. drums. Each drum contains approximately 480-500 lb. of yellow uranium salt.

The Cloud Over Indian Manganese

A quota system for controlling exports of iron and manganese ores has been introduced by the government of India. A disturbing feature of the new regulations is the generous provision which has been made for the allocation of quotas to a State-owned undertaking.

Approximately 28 per cent of the Free World supply of manganese ore comes from India. Last year the improved market resulting from the higher level of activity in the U.S. and European steel industries resulted in the re-opening of mines that had been closed down during the price slump of 1953-1954. Unfortunately producers and shippers were prevented from benefiting fully from the more favourable market conditions by the chronic shortage of locomotives and railway wagons, which was aggravated by rising demands from other industries.

Despite this handicap the manganese industry made a partial recovery last year from the effects of the slump. Statistics recently made available by the Indian government indicate that output of manganese ore in 1955 amounted to 1,570,000 tons, valued at 100,000,000 rupees, which was 12 per cent higher than in 1954.

The inadequacy of the internal transport system might be described as the Achilles heel of India's economy. Not only is the carrying capacity of the railways too limited to move ore exports expeditiously to the ports, but the ports in turn lack the facilities to transfer them smoothly and steadily on to ships. These difficulties are by no means peculiar to India and will doubtless be overcome in time, though it may well be that in the years immediately ahead they will be further accentuated by the expansion of mining and heavy industry projected under the second Five Year Plan. More disquieting, in view of its long-term implications, is the possibility that the inadequacy of railway transport facilities might be used as a means of favouring State-owned undertakings against private users, as would appear, *prima facie*, to be foreshadowed by the entry of the State Trading Corporation into the export ore trade.

NEW QUOTA SYSTEM

On July 27, the government announced its decision to regulate the export of iron ore and manganese ore during 1956 on the basis of the quota held or exports effected during the six months period July-December, 1955, The position as it stands at present seems to be that export quotas wil be granted to shippers on the basis of two-thirds of the quotas allotted to them for the half-year July-December, 1955. Shippers who effected exports during the half-year July-December, 1955, otherwise than against quotas will be granted quotas on the basis of actual performance. Quotas will be allotted to them equal to three-fourths of their shipments during that period through the port concerned. Wagons will be allotted to shippers by the Railway authorities on a *pro rata* basis on the lines used by them during July-December, 1955.

These arrangements do not cover shippers having no performance or quota to their credit during July-December, 1955. It was subsequently decided that quotas might also be issued to such parties to a similar extent on the basis of the quotas held by them or their performance during the half-year January-June, 1956.

The position of the mineowners is still not clear. Mineowners will be granted quotas on the same proportional basis as shippers, but their quotas seem to refer to production and sales only—not to rail transport or export licences.

These regulations appear to have stabilized exports for the time being on the basis of 75 per cent of previous performance, but shippers having forward contracts in excess of this quantity are still in an unenviable position and are doing their utmost to have their quotas increased. In most respects, however, the new quota system seems to be a reasonable attempt to make the best of a bad job. Providing that the special treatment is forthcoming for shippers with forward contracts, there seems no reason why it should not be generally acceptable to the trade, but for the threat of State encroachment.

THE STATE TRADING CORPORATION

When the State Trading Corporation was constituted, the government made it clear that the purpose of this undertaking would be to supplement, not to usurp, the functions of private trade. In his statement on industrial policy earlier this year, Mr. Nehru gave no indication that it was intended to channel iron ore and manganese exports through a State body. Yet provision has been made in the new licensing system for quotas to be allocated to the State Trading Corporation within a ceiling of one-third of the total quantity to be allowed for export during the period July-December, 1956.

Government officials maintain that by letting the State Corporation handle certain ore exports, it will be possible to secure higher priority for such ores in the allotment of railway wagons. It has even been hinted that the corporation, by virtue of its State ownership, intends to push the railways into allocating more wagons for the movement of ores. If it is indeed government policy to use the difficulties of the railways first as a justification for State encroachment and subsequently a means of discriminating against established traders in favour of the State-owned body, the outlook for private entrepeneurs can only be regarded as discouraging in the extreme.

There have also been suggestions in official quarters that by channelling certain exports through the State Trading Corporation, India can earn more foreign exchange. This argument seems to be based on the assumption that contracts with foreign buyers have been negotiated at prices below those ruling on markets. It can scarcely be disputed, however, that private traders entering into contracts are out to secure the most favourable terms they can achieve, and are quite as capable of securing the best possible prices as the State. The fact is, of course, that manganese exporters are no longer in a position to call the tune, as India's own still quite recent experience clearly shows.

The government's entry into this field has not been accomplished without vigorous opposition from the ore trade. In fact, one of the big operators sued the State Trading Corporation and obtained an injunction against it, but in view of the wide scope made available to the corporation under the new quota system, it seems probable that this case has been dropped.

Meanwhile, the trade is wondering to what extent the State Trading Corporation plans to extend its activities in the field of export ores. Is this the "thick end" of the wedge? If the corporation intends to become eventually the sole channel for the sale of export ores, will it ultimately decide to take over the mines as well? If so, it will find that the production of manganese ore is by no means a simple matter, bearing in mind that customers are becoming increasingly exacting and ores must be supplied in a variety of grades and qualities to suit different requirements.

Mining Expansion in Southern Rhodesia

The annual report of the Chief Government Mining Engineer and Chief Inspector of Mines for 1955 records steady expansion in the mining industry of Southern Rhodesia which is expected to continue.

Last year mineral production in Southern Rhodesia reached a record value of £20,500,000. During the first months of this year the value has risen by 16 per cent over the same period in 1955. This position is very pleasing, considering that many gold mines are finding it difficult to meet working costs. Taking into consideration the uses now being found for the lesser known minerals, it is expected that steady progress will be continued. The wide variety of minerals now produced suggests a balance which would be very acceptable to many industrialized countries.

VALUE OF ASBESTOS

With an output last year of 105,261 s.tons valued at £7,051,832, asbestos has become the territory's most valuable mineral. In the first four months of this year production amounted in value to £2,894,000. There seems every reason to believe that asbestos will maintain its premier position, since manufacturing capacity is still expanding with a consequent increase in requirements, particularly in the asbestos cement industry. Most producers confidently anticipate price increases up to 10 per cent in the coming year.

An interesting indication of the qualities of fibre produced is shown in the table below which refers to the Fort Victoria district only.

Since 1950 the value of the gold output has become more or less stabilized and this trend is likely to continue. In 1955, 2,392,042 tons were milled for a production of 524,701 oz. of gold. The number of producers has fallen to the provisional figure of 348 from 381 in 1954 and 783 in 1947. The further decline is due almost entirely to the smaller mines being forced out of production by rising costs. An increase in grade milled from 4.23 dwt. to 4.39 dwt. is an indication that the steady advance in working costs cannot be absorbed by increased efficiency; the larger mines capable of increasing the grade by selective mining have been forced to do so. In 1956 a decrease of some 14,000 oz. is anticipated.

The value of the coal output rose in 1955 to £3,422,226 from £2,702,279 the previous year, reflecting normal progress which must continue steadily unless there are strikes or other unusual occurrences. The report states that the Wankie Coal Price Agreement is working satisfactorily, partly due to an incentive clause promoting price reduction, partly to the high sense of duty of the company, and mainly to the interest and efficiency shown by the management and men. The price of 19.62s. per ton compares with 18.59s. in 1954 and 11.38s. in 1951. Mining conditions were good throughout the year, but production was seriously restricted by the inability of the Rhodesia Railways to carry from Wankie the planned output of the three collieries, which are now equipped to produce 5,000,000 tons.

The colony ranks fifth among world producers of chromite and could improve this position given more railage facilities. Southern Rhodesia is one of the main producers of high grade metallurgical chrome. Last year the railways transported 449,000 tons of chromium worth more than £2,000,000. The mines were capable of producing more than twice that amount.

Southern Rhodesia has become one of the leading world suppliers of lithium. No doubt, still further activity in the search for this mineral will be evident in the future. The Bikita deposits of lepidolite and petalite have proved to be large and are possibly among the richest in the world, containing 3.6 per cent Li_2O compared with 1-2 per cent in most other fields. Some of the output is being processed by Lithium Products (Pvt.) Ltd., of Gwelo, who hope to double the capacity of their plant in the near future.

Bikita Minerals (Pvt.) Ltd. produced 51,469 tons of lithium minerals in 1955. At the company's Mauve Kop quarry, the tonnage of lepidolite declared per month rose from 2,475 tons in January to 5,594 tons in December. The wide lepidolite body has been blocked out over a distance of 400 ft. in the shallow adit about 90 ft. below the crest and has also been intercepted at a further 110 ft. vertically below in the deep adit. An advance in the adit of 648 ft. in one month was probably a record for Southern Rhodesia. There may be some increased production in 1956 when the proposed washery plants are brought into commission.

G. H. Nolan (Pvt.) Ltd. produced 24,120 tons of petalite and 4,443 tons of lepidolite. A plant, is being erected to treat gravels said to extend 200-300 yd. on the footwall of the petalite-bearing pegmatite body mined by this company. Tin and tantalite will be recovered, as well as beryl and lepidolite, from the sorting belt. It is hoped to treat 500 tons of gravels per 24 hours.

Intense activity in the search for copper deposits was reported from all parts of the Colony, but most of the discoveries examined proved to be of insufficient size to warrant exploitation.

The Umkondo copper mine owned by the Messina (Tvl.) Development Co. Ltd. came into production in May and output has been at the rate of 133 tons per month. In the first four months of this year, 605 tons of copper concentrates was produced. Some £4,000,000 is being spent on the development of the Molly Mine near Sinoia, which is scheduled to start production in 1959.

TIN A RISING ASSET

Tin is rapidly becoming a major asset. In 1954, the total production in Southern Rhodesia was 23 tons. Kamatavi Smelting and Refining Co., a subsidiary of the Dutch Billiton group, has begun production at the Kamatavi mines about 180 miles north-east of Bulawayo. Last year output amounted to 334 tons and this year it is likely to be doubled. Production for the first four months was 187 tons. Enough tin is already being produced to satisfy the requirements of the Federation and export markets for refined tin are being developed in the Union of South Africa and Portuguese East Africa. Here again, however, transport is a factor which cannot be overlooked. It costs 1s. less to bring a ton of refined tin to the Union from Singapore than from Kamatavi.

DECLARED PRICE OF ASBESTOS FIBRES, FORT VICTORIA DISTRICT

Year	Size 2		Size 3		Size 4		Unclassified		Total	
	Tons	Value £	Tons	Value £	Tons	Value £	Tons	Value £	Tons	Value £
1954	172	23,840	7,562	587,759	14,233	681,478	3,187	189,710	25,154	1,482,787
1955	268	31,567	7,369	551,782	15,625	756,661	11,576	555,940	34,838	1,895,950

TECHNICAL BRIEFS

New Coal Washing Techniques

A new development in coal washing techniques is reported from Germany. The firm of Badische Anilin und Soda Fabrik has been experimenting with chemical sedimentation aids to precipitate matter suspended in the water during the cleaning process. Present washing methods often result in the coal itself having a high water content, and in the water becoming fouled by suspended material. This frequently necessitates special settling tanks.

The new technique should avoid this need, for, by adding small quantities of special chemicals, the water is cleared easily, resulting in increased efficiency in filter and flotation plants, and simplification of separation. Experiments with the new process have been successfully carried out in Germany, France and Holland.

Centrifugal Separation of Liquid and Solid Phases from Binary Alloys

Centrifugal procedures for refining crude aluminium-silicon alloys, for separating metals having different melting points, and for the purification of molten metals have been reported, but are not widely used in the metallurgical industry of the United States. As part of a study of the possibilities of using centrifugal techniques in the scrap alloy field a small centrifugal for treating molten metals was developed and has been described in a report from the U.S. Bureau of Mines. The centrifugal comprises essentially a 3 in. dia. spinner pot revolving in a gas-fired furnace at speeds up to 3,000 r.p.m. It was used to study the efficiency of separation of liquid from solid phases in binary lead alloys based on equilibrium phase diagrams. It is shown that in such cases a separation of over 90 per cent is possible.

Successful separations were also effected in the case of Pb-Mg, Bi-Mg, Sn-Mg and Sn-Fe alloys. In the latter case the centrifugal process appears to be superior to current industrial filtration procedures for separating Sn-Fe intermetallic from molten tin.

New Oxidation-Hardening High Silver Alloy

Handy and Harman, U.S. manufacturers of silver alloys for various industrial purposes, have developed a new oxidation-hardening high silver alloy, which is claimed to offer an unusual combination of excellent electrical and mechanical properties. The company has reported that the outstanding characteristic of the new alloy—a silver-magnesium-nickel composition—was that it was easily worked while soft, and then irreversibly hardened by heating in air.

The Haynes Steelite Company claims that its hastelloy alloy R-235 — a wrought nickel-base, aluminium-and-titanium-bearing, precipitation-hardening alloy — has outstanding properties through 1,750 degrees F. It is said to have good oxidation resistance, a low strategic alloy content and a remarkable resistance to over-aging in service. The alloy is produced by vacuum-melting.

Existence of the " Neutrino " Confirmed

The neutrino, an atomic particle so small it is described as having " vanishingly small mass ", has been detected by a Los Alamos and Savannah River group in the United States. The neutrino has been known to exist for 20 years since Fermi and Pauli found its existence necessary to explain processes in the production of beta particles. The recent detection is a confirmation of this previous near-assumption.

Neutrinos are so penetrating that they are reported as being able to pass through billions of miles of solid matter. The infinitestimal particles were detected by exceedingly complex instruments which isolated the neutrino's signal from a background of cosmic rays and other activities. A scintillation type detector was employed, containing 1,000 gals. of liquid scintillator and 330 photo-multiplier tubes.

The detection was described as a man-caused direct reversal of the radioactive process called beta-decay. Normally stable protons were made to absorb a neutrino, emit a positive electron, and become neutrons.

REVIEWS

Mineral Resources of Rajasthan, *by M. L. Sethi, M.E.M. (Colorado), B.Sc.(Mining), M.M.G.I. Bulletin No. 4. Published by the Government of Rajasthan. Pp. 168 with illustrations in half-tone. Map supplement. Price Rs. 5/8/-. Available from the Department of Mines and Geology, Rajasthan.*

Rajasthan's mineral development has progressed steadily during recent years. The State is industrially backward and in consequence much depends upon the proper utilization of minerals in the future.

Absence of specific data on mineral resources has until recently impeded exploitation. For some time there has been felt an urgent need for a publication, based on the knowledge gained during the last decade, to make available to prospector, miner, consumer and administrator alike the latest details of available knowledge.

The work under review fills this gap. The minerals included in the text are those which are important from the industrial point of view and have been assessed as capable of economical exploitation. A number of these minerals already are being worked. The chapters on " Mineral Survey and Departmental Prospecting " and on " Mineral Administration " have been included to indicate the importance of these phases. A useful handbook.

Colliery Year Book and Coal Trades Directory 1956. *34th Edition. Published by Iliffe and Sons Limited. Pp. 976. Price 30s. net. By post 31s. 6d.*

This 34th edition of the *Colliery Year Book* follows the pattern of previous issues presenting in a convenient form the fullest information on the coal mines and allied industries.

Details of coal mines in Western Europe and the United States of America introduced in recent editions have proved of interest and with the co-operation of friends abroad these features have been revised and again appear. Full particulars of every coal mine in Great Britain, current information regarding the Ministry of Fuel and Power and the National Coal Board are included and the standard data, regulations and statistical sections have been brought up to date.

A foreword by the Chairman of the National Coal Board, Mr. James Bowman, C.B.E., stresses the problems facing the industry and the great responsibilities shared by all concerned. A valuable book of reference.

Year Book of the American Bureau of Metal Statistics for the Year 1955. *Published by the American Bureau of Metal Statistics, 50 Broadway, New York 4, N.Y. Price $3.00 a copy, post paid.*

This is the 35th issue of the international survey compiled annually by the Bureau, which is sponsored by the most important producers of copper, lead and zinc in the U.S., Canada, Mexico, Chile and Peru. Production and other economic statistics are recorded on a world-wide basis for copper, lead, zinc, aluminium, gold, silver, tin, antimony, bauxite, cadmium, cobalt, magnesium, molybdenum, nickel and platinum, together with tables of metal prices and lists of metallurgical plants and their capacities.

Lehrbuch der Bergwerksmaschinen, *by C. Hoffmann. 5th Edition. Published by Springer-Verlag, Riechpietschufer 20, Berlin W.35. Germany. Pp. 534. Price: D.M. 36. Published in German.*

The work under review is a textbook which deals not only with the usual mining machinery actually used for cutting, loading, etc., but also for auxiliary machinery such as pumps, ventilation, and like equipments.

This manual serves as a foundation for technical students at mining schools and colleges. It is also suitable, however, for mine officials and as a useful help to those erecting and maintraining machines in mines. Very fully illustrated with diagrams and drawings.

MINING MISCELLANY

Another Canadian mining firm is interested in securing leases on existing mineral deposits in Eire, including copper, gold, iron, silver or lead. Its name has not yet been revealed, but national newspapers have carried an advertisement asking for information on abandoned mining properties or surface showings. The advertisement said that one of Canada's foremost geologists would soon visit Eire to examine mining properties and deposits.

* * *

The Central Statistical Board of the U.S.S.R., reporting in Tass, has announced that the production programme for copper, aluminium, nickel, tin and rolled non-ferrous metals was over-fulfilled during the first half of 1956. The plan for gross industrial output was fulfilled by industry as a whole by 102 per cent. During this period production of pig iron increased by 9 per cent, steel by 8 per cent, and rolled metal by 7 per cent.

* * *

The Belgian Government has invited the International Labour Office to participate in the work of two technical committees which it has set up following the mining disaster of Marcinella. The Belgian invitation has been accepted by Deputy Director-General Jef Rens. The ILO will shortly designate its representatives to the two committees, one of which will inquire into the circumstances of the disaster, while the other will be charged with revising the Belgian mining regulations.

* * *

We are advised by Cable Belt Ltd., that the longest single stage belt conveyor in Great Britain, and possibly in the world, started operation on August 13 in No. 6 Area, East Midlands Division of the National Coal Board. It is a cable belt conveyor having a length of 8,460 ft. and a lift of 335 ft. with a belt width of 36 in., running at 250 ft. per minute to handle 300 tons/hour of R.O.M. coal. The conveyor is driven by one driving unit powered by a 220 h.p. motor.

* * *

Work is starting immediately on an important new copper discovery recently acquired jointly by Noranda and Prospectors Airways at McInnes Lake, 12 miles south-west of Coldstream Copper Mines in north-western Ontario.

* * *

Possible indications of a second large Quebec iron ore mining project have been announced by the Mines Department of Quebec. Prospecting is reported to be particularly active in the north of Shelter Bay, some 50 miles west of Seven Islands, the shipping terminal of the Iron Ore Co., of Canada, which is currently undertaking large mining operations in Ungava. Several companies are prospecting in this area, which is believed to be rich in iron ore.

* * *

A mobile excavator weighing 1,250 tons and equipped with six electro-motors has been built in Czechoslovakia for opencast mining, states the Soviet monthly Tekhnika Molodyezhy. It runs on six caterpillar tracks and loads the surface soil on conveyor belts which carry it to 80-ton tipping trucks.

* * *

Geologists of the Geological Survey, working in co-operation with the National Department of Mineral Production of Brazil, under the auspices of the International Co-operation Administration, have reported a large find of zinc and copper deposits near the small village of Vazante in the north-western part of the State of Minas Gerais, Brazil.

* * *

A threatened strike of about 5,000 workers in the Norwegian mining industry was forbidden by the Government, which ordered that the dispute should be submitted to a special committee with powers to work out a compulsory solution.

* * *

An estimated 14,000,000 tons of workable coal of reasonable quality lie on the northern border of Nyasaland, states the Nyasaland Department of Geological Survey, but before this can be proved an extensive drilling programme is required. The department claims that the coal is similar to some medium grades of Transvaal coal. The seams are steeply dipping and opencast working would not be possible. However, it should be possible to work coal less than 500 ft. from the surface, unless there is interference from underground water, by means of inclined tunnels driven into the hillsides. The coalfield lies on the south side of the Songwe River, near the Tanganyika boundary.

* * *

Diamond drilling operations are being stepped up by Salamet Mines Ltd., a company in which Meta Uranium Mines Ltd. has the major financing interest. Drilling has so far indicated more than 500,000 tons averaging about 1 per cent copper and $1 per ton in precious metals. The objective is 1,000,000 tons of 1 per cent copper, at which point a 500-ton per day plant would be justified. The property is in the active Greenwood copper area, British Columbia.

* * *

A second find of limestone deposits has been made in the Western Region of Nigeria as a result of drilling by a senior geologist of the Associated Portland Cement Co. in collaboration with the Western Region Production Development Board. The Western Region Government is anxious to set up its own cement factory.

PERSONAL

Mr. A. Gillott has been appointed secretary of the Wolverhampton Metal Co. Ltd. to succeed Mr. R. M. Parker, who leaves shortly for Adelaide, South Australia. Mr. R. J. Hughes has been appointed deputy-secretary.

* * *

Changes were announced last week in the directorates of 24 companies of the Anglo American Corporation of South Africa, Ltd. Group. Most of them involve a redistribution of directorships among members of the various boards. Among the new names are those of Mr. C. P. Green, D.S.O., D.F.C., who replaces Mr. H. F. Oppenheimer as a director of Western Reefs Exploration and Development Co.; Mr. N. K. Kinkead-Weekes, who has been appointed to the boards of President Steyn Gold Mining Co., the South African Land and Exploration Co., Springs Mines and Welkom Gold Mining Co.; Mr. G. W. Pooley, Epoch Investments, Springs Mines and Western Holdings; Mr. J. W. Shilling—South African Townships, Mining and Finance Corporation; and Mr. R. C. Drew—the Vereeniging Estates Ltd. Dr. H. Jacobs has been appointed to the board. of the Vereeniging Brick and Tile Co. as managing director.

* * *

The address of the Lead Industries Association has been changed to 60 East 42nd St., New York 17. Telephone: Murray Hill 2-2633.

* * *

Dr. H. W. Melville, F.R.S., took up his appointment as secretary of the Department of Scientific and Industrial Research on August 27. Dr. G. B. B. M. Sutherland, F.R.S., will take up his appointment as director of the National Physical Laboratory on September 14.

* * *

Mr. O. T. Evans has been appointed assistant chief engineer (mining), Electrical General Engineering Department, of Metropolitan-Vickers Electrical Co. Ltd.

* * *

An exhibition on the theme of "Metals at High Temperatures" is being organized by the Department of Metallurgy at Sheffield University, to be held at Sheffield concurrently with the meeting of the British Association for the Advancement of Science from August 29 to September 5.

* * *

Mr. F. G. Atherton and Mr. C. F. Grundy have been appointed directors of the Cementation Co.

* * *

The United States World Trade Fair will be held in the Coliseum, New York City, from April 14-27.

CONTRACTS AND TENDERS

The following future authorizations have been announced by the International Co-operation Administration (ICA):

Egypt

	Terminal Delivery Date	*Amount (In U.S. dollars)*
Construction, mining and conveying equipment; survey instruments and scientific field equipment (PIO/C No. 62-21-122-5-41226)	31-12-56	21,730

Korea

Bituminous coal:—

(PIO/C No. 89-33-240-5-60201) ...	31-12-56	2,472,000
(PIO/C No. 89-33-240-5-60199) ...	30-11-56	2,117,000
(PIO/C No. 89-33-240-5-60200) ...	30-11-56	124,000

B.O.T. Ref. E.S.B./20257/56/ICA. Telephone enquiries to Chancery 4411, Extension 360.

Formosa

Three pneumatic sump pumps, vane type mine fan, two 2-stage vertical air compressors six pneumatic rock drilling machines, 168 drilling rods, 1,400 rock drill bits, two rock shovels, hose couplings, oil furnace, etc. Project Implementation Order No. 84-21-007-9-60330 (INV. No.: U.S.-120-C). Issuing authority, Central Trust of China Purchasing Department, 68 Yen Ping Nan Road, Taipei Taiwan (Formosa). Closing date, September 20, 1956. B.O.T. Ref.: E.S.B./21295/56/ICA. Telephone enquiries to Chancery 4411, Extension 360.

METALS, MINERALS AND ALLOYS

COPPER.—Russia, by her menacing attitude towards any settlement of the Suez Canal dispute envisaging International Control and by her blatantly offensive propaganda throughout the Middle East, is all too quickly raising the Suez Canal affair into another East-West crisis. This thought outweighed the good news that Colonel Nasser is prepared to discuss the majority plan recommended at the London Conference for the control and operation of the Suez Canal and non-ferrous metal markets have remained firm.

This applies particularly to copper which has also been aided by the absence of any news as to how the U.K. government intends to dispose of its copper stocks. However, these are not the only bullish factors affecting this market. Labour disturbances continue in Rhodesia where the African Mine Workers' Union having effected a series of strikes at each copper mine and at Broken Hill, has now enforced a ban on overtime by African miners throughout the Copperbelt. In terms of tonnage lost this may not mean very much. But with its clear indication that all is not well in the Rhodesia copper industry fears are being expressed that the Union may take other and more drastic action.

There is, too, the distinct possibility of a strike occurring at the Garfield Refinery of American Smelting and Refining. This is a tricky situation as the renewal of the labour contract, which expires to-day, is being negotiated by the Steel Workers' Union, which is holding out for the wage package granted to the U.S. Steel Workers. This amounts to about 45 c. an hour and contrasts sharply with the package deal of 31 c. an hour obtained by the Mine Mill Union. If the higher steel wage proposal is obtained the resulting differential could touch off all-round labour unrest in the U.S. non-ferrous metal industry.

In the face of these disturbing possibilities, it will be interesting to see whether the R.S.T. fixed price will be adjusted upwards next week.

Meanwhile, the U.S. producers are holding their price at 40 c. and custom smelters at 39 c., although dealers are making the metal available at 38 c. a lb. While there is every hope that U.S. demand will show a strong revival next month, at present the market is flat and featureless.

From the beginning of next year, the Copperbelt Technical Foundation will be responsible for the theoretical training of all apprentices on the Copperbelt. The arrangement is limited to the Copperbelt towns of Kitwe, Mufulira, Chingola and Launshya, where the Foundation intends to build its own teaching centres, and to Kalulushi and Bancroft. It will apply to apprentices in all industries and not only to those of the copper mines. Apprentices in Ndola and the remainder of Northern Rhodesia will still be the responsibility of the Ministry.

LEAD.—Lead has experienced another good week and the New York price remains firm at 16 c. a lb. Demand is strong from several quarters, particularly from battery manufacturers, who are approaching their peak buying season. In July, replacement battery shipments were the highest for any month since last December and at 2,122,600 units they compare with 1,700,000 in June and 2,024,000 in July last year. With no large stocks of metal overhanging the market, only token amounts are expected to be offered to the GSA for the government stockpile this month.

TIN.—Tin continues to move in sympathy with developments at Suez but the undertone is firm on both sides of the Atlantic as the latest statistical information shows that little, if any, surplus metal will be available for the rest of the year. This could be an understatement as the U.S. demand for tin mill products, particularly tinplate, is becoming growingly insistent with order books full to the end of the year and demand now spilling over into the first quarter of 1957.

Meanwhile, the labour dispute in Nigeria is yielding to discussion and latest advices indicate that only minor differences now stand in the way of a settlement.

ZINC.—Zinc, which has been a weak market both here and in New York for some months, is now showing signs of coming to life. U.S. galvanizers are expanding their demands for prime western and die-casters are now coming back into the market for special high-grade. The increased activity now being displayed is attributed to the continued upsurge in steel production as well as to anticipation of the approach of the new automobile production season. The price is holding steady at 13¼ c. per lb. East St. Louis.

ALUMINIUM.—The aluminium industry like an industrial Alexander in search of new worlds to conquer, is continually setting its target ever higher. At the end of the war, world production of primary metal was in the region of 760,000 l.tons and not till 1947 did it exceed 1,000,000 tons. By 1958 a single company, Alcoa, will have installed capacity to produce nearly 1,000,000 s.tons annually, as a result of further expansion plans. By the end of 1959 the capacity of a second North American producer, Alcan will exceed 1,000,000 tons.

Alcoa has announced that in mid-September it will begin construction of a seventh potline at its Point Comfort works, adding 20,000 tons to the present installed capacity of 120,000 tons of metal annually. Target date for production for the new line is January, 1958. This addition, along with 150,000 tons of new production due about the same time from the company's Warrick (Indiana) works, now under construction near Evansville, will bring Alcoa's total installed capacity to 962,000 tons annually. First production from the Warrick Works is scheduled for the autumn of 1957, with full output due in 1958. The step-up in smelting capacity represents a major part of the overall expansion and modernization plans described recently by the company's president, Mr. I. W. Wilson, who said that the complete programme might involve capital expenditures of up to $600,000,000 in the next five years.

Kaiser is also reported to be planning for further expansion following completion of its present investment programme of over $300,000,000 by the end of 1957. By that time, the company's primary aluminium capacity will have been increased 35 per cent over end-1955 capacity to more than 680,000 tons of primary aluminium a year.

From Canada comes news of a spectacular project involving new 1,000,000 h.p. facilities at Chute-des-Passes on the Upper Peribonka River. Alcan has completed arrangements with the Quebec Government under which the company will construct the new power plant. Power from the station is expected to be available in about three years. The plant will provide current for an additional 120,000 tons of aluminium smelting capacity in the Saguenay region. Its site has not yet been disclosed. The planned Quebec expansion and the development proposed for Kitimat will increase Alcan's aluminium producing capacity from 650,000 tons per year at the end of 1955 to a figure in excess of 1,000,000 tons by the end of 1959. Cost of the new power plant is put at some $150,000,000. A notable indication of aluminium's expanding uses is afforded by the shipment of pipe and coupling equipment for the longest aluminium pipeline ever installed in an oil field outside the U.S. Reynolds Metal, who manufactured the pipe, and Race and Race, Inc., maker of couplings, have pioneered the development of low-cost, light-weight aluminium pipe-line systems for use as temporary oil, gas and water lines. More than 3,000 miles of the portable systems are now in use in the U.S. Bearing in mind that the oil industry envisages a time when an annual output of at least 1,000,000,000 tonnes will be needed to satisfy international demand, it is evident that this industry alone promises to become a major outlet for aluminium.

COLUMBIUM.—Producers of columbite ore suffered a severe setback in May last year, when the U.S. Government refused to renew existing contracts or enter into fresh commitments for the purchase of ore for the stockpile. Now the Office of Defence Mobilisation has called upon the Department of Defence for a special study of columbium-tantalum requirements in the light of a heavy increase in current demand. The study will be made for the purpose of determining whether the expansion goal for columbium-tantalum should be re-opened to encourage an increase in production.

Columbium's importance, already very great, promises to be enhanced as the result of a research programme, supported by General Electric, which is designed to discover whether this metal is a practical material to use in gas turbine engines. At present the metals used in the gas turbine engines of high speed jets can withstand temperatures up to 1,000 deg. C. If a metal can be discovered which can withstand even higher temperatures, the speed of the jet will be proportionately increased. Such a metal must also be resistant to oxidation and inexpensive. Experiments at Carnegie Tech. suggest that columbium may be the key to even faster supersonic flight.

According to the sales manager and chief metallurgist of the Molybdenum Corporation, the world's largest known single deposit of columbium has been discovered at Oka, Que, near Montreal, and will ensure an ample supply of this metal for future requirements. The Molybdenum Corporation also announced recently that, following completion of Government

stockpiling, its ferro-columbium is again available in unlimited quantities for commercial use.

MANGANESE.—The market for manganese ore remains very firm, U.S. prices for the higher grade ores being greater than any figures quoted in Britain. The structure of the market is unsound, however, to the extent that if the internal transport situations in India and South Africa eased and shippers were able to keep up to date with forward contracts, prices would inevitably drop. The quotations in this journal indicate the range of prices at which long-term business is being done. Deliveries under forward contracts are so far behind, however, that substantially higher prices are being asked and obtained by exporters able to offer consignments for immediate shipment. The rail transport position in India has improved considerably in recent weeks, but this may be entirely seasonable. There has been no concrete evidence of any exporter being able to ship beyond the limit of his quota.

MOLYBDENUM.—Price increases averaging 8 per cent for molybdenite concentrate and molybdenum products have been put into effect by Climax Molybdenum. New prices per lb. of contained molybdenum include $1.18 for concentrate, $1.39 for canned oxide, and $1.68 for ferro-molybdenum other than powder.

Rising industrial consumption of molybdenum and new uses being opened up by research are forecast by the research department of Harris, Upham & Co., an investment firm in New York. A study by this company points out that the high temperature advantages of molybdenum alloys are important in military applications, for both aircraft and guided missiles. Industrial consumption is rising and should absorb any excess supplies developing from the termination of a U.S. government contract this year. Molybdenum increases corrosion resistance in certain grades of stainless steel going into the chemical industry. It also continues to gain in the high-speed tool field. Research activities have broadened the use of molybdenum in tool steels, stainless steels, high temperature alloys, cast steel, cast iron, chemical catalysts, lubricating agents and pigments. Research on wider chemical applications and enlarged usage in agriculture is projected.

TITANIUM.—The undertone of the Australian rutile shipment market is reported to be a little more restrained. Quotations currently range from £100 to £110 per ton c.i.f. for minimum 95 per cent material against £100 to £115 previously. Supplies for near shipment are stated to be more plentiful.

URANIUM.—By next year four additional mines, each a major producer of uranium, will be in production in Blind River area of Ontario. This will triple the camp's acid requirements to about 1,500 tons daily. Before the first unit of Noranda Mines' 500-tons-a-day sulphuric acid plant now under construction in the district can reach full operation, the acid requirements of this fast-growing camp will have soared far past the designed capacity of the new chemical plant. The original plans have, therefore, been revised and either other sulphuric acid plants will be erected or Noranda's capacity increased. The ultimate production will represent one of the biggest sulphuric acid operations in the world.

A comprehensive report on the geology of uranium and thorium and methods of prospecting for these radioactive elements has been published by the U.S. Geological Survey as Professional Paper 300. It is obtainable at $6 a copy from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.

The London Metal Market

(From Our Metal Exchange Correspondent)

The markets have been relatively quiet during the last week, as apart from the Suez question dealers have had to assess the probable outcome of the negotiations at Garfield and the possibility of trouble amongst the natives employed on the Rhodesia Copperbelt. The general feeling seems to be that either one or more of the "bullish" factors will become reality with a subsequent upward movement in the market. There are also signs that a number of European users will have to buy metal in the near future, and it is considered that, with the additional probability of American buying increasing after Labour Day, a firming in the price is to be expected in any event.

The tin market has been featureless, but attention is once more being drawn to estimates showing that production and consumpion will be almost in balance for the remainder of this year: if this should prove to be a fact then the International Tin Pool will find its existence is unnecessary, and it is being said in some quarters that a further lapse of anything up to a year may occur before any operations on its part are possible. On Thursday morning the Eastern price was equivalent to £790½ per ton c.i.f. Europe.

Lead and zinc have continued to move from producer to consumer in reasonable quantities, and it is considered that the offtake into the battery trade will be sufficient to maintain the lead price for some weeks to come, whilst in the zinc market the nearby position remains relatively tight and with no weight of forward metal being disposed of the general price level should remain unchanged.

Closing prices and turnovers are given in the following table:

	August 23		August 30	
	Buyers	*Sellers*	*Buyers*	*Sellers*
Copper				
Cash	£298	£298½	£301	£301½
Three months	£298	£299	£300½	£301
Settlement	£298½		£301½	
Week's turnover	6,750 tons		4,700 tons	
Tin				
Cash	£772	£774	£768	£769
Three months	£770	£771	£765	£766
Settlement	£774		£769	
Week's turnover	555 tons		605 tons	
Lead				
Current half month	£115	£115½	£115½	£115½
Three months	£114	£114½	£114½	£114½
Week's turnover	2,250 tons		1,475 tons	
Zinc				
Current half month	£94½	£95	£94½	£95½
Three months	£92½	£93½	£93½	£94
Week's turnover	2,750 tons		2,650 tons	

OTHER LONDON PRICES — AUGUST 30

METALS

Aluminium, 99.5%, £198 10s. per ton
Antimony —
English (99%) delivered, 10 cwt. and over £210 per ton
Crude (70%) £200 per ton
Ore (60%) bases 23s. 6d./24s. 6d. nom. per unit, c.i.f.
Bismuth
(min. 1 ton lots) 16s. lb. nom.
Cadmium 12s. 0d. lb.
Chromium, 6s. 11d. lb.
Cobalt, 21s. lb.
Gold, 251s. 5½d.
Iridium, £29/31 oz.
Manganese Metal (96%-98%) £259/£265 according to quantity
Magnesium, 2s. 4d. lb.
Nickel, 99.5% (home trade) £519 per ton
Osmium, £24/27 oz. nom.
Osmiridium, nom.
Palladium, £8 0s./£8 10s. oz.
Platinum U.K. and Empire Refined £34/£35 oz. Imported £37 15s. nom.
Rhodium, £42.
Ruthenium, £15/£17 oz.
Quicksilver, £83 10s. ex-warehouse
Selenium, 112s. nom. per lb.
Silver, 78¼d. f.oz. spot and 78¾f'd.
Tellurium, 15s./16s. lb.

ORES, ALLOYS, ETC.

Bismuth .. .. 65% 8s. 6d. c.i.f.
20% 3s. 3d. lb. c.i.f.
Chrome Ore —
Rhodesian Metallurgical (semifriable) 48% £16 15s. 0d. per ton c.i.f.
„ Hard Lumpy (45%) £16 15s. 0d.
„ Refractory 40% £10 15s. 0d. per ton c.i.f.
„ Smalls 42% .. £13 15s. 0d. per ton c.i.f.
Baluchistan .. .. .. £17 5s. 0d. c.i.f.
Magnesite, ground calcined .. £28 0s./£30 0s. d/d
Magnesite, Raw (ground) .. £21 0s./£22 0s. d/d
Molybdenite (85% basis) .. 8s. 2½d. nom. per lb. (f.o.b.)
Wolfram and Scheelite (65%) 244s. 0d./248s. 0d. c.i.f.
Tungsten Metal Powder (98% Min. W.) .. 20s. 0d. nom. per lb. (home)
Ferro-tungsten (80%-85%) .. 17s. 0d. nom. per lb. (home)
Carbide, 4-cwt. lots .. .. £41 3s. 9d. d/d per ton
Ferro-manganese, home .. £68 per ton
Manganese Ore Indian Europe (46%-48%) basis 125s. freight .. .. 105d./106d. nom. per unit c.i.f.
Manganese Ore (43%-45%) .. 98d./99d. nom. per unit c.i.f.
Manganese Ore (38%-40%) .. 92d. nom. per unit.
Brass Wire .. .. .. 3s. 0d. per lb. basis
Brass Tubes, solid drawn .. 2s. 4½d. per lb. basis

COMPANY NEWS AND VIEWS

Prospective Gold Fields and Central Mining Merger

Preliminary conversations have been entered into between the Consolidated Gold Fields of South Africa and the Central Mining Investment Corporation with a view to merger between their two organizations. Substantial advantages it appears would arise from such an arrangement. Besides having great financial strength the merged companies would be well placed to take full advantage of new mining and other opportunities which are being actively sought in Africa, North America and elsewhere. Operating economies and other benefits should also be gained.

Existing investment portfolios of the two companies would, it is thought, combine satisfactorily thus affording a wider diversification of interests for their respective shareholders.

After consultation with J. Henry Schroder and Co.—who have taken part in the conversations from the beginning—the two boards have agreed to use as the basis for any merger the comparative value of respective assets.

It is emphasised that the form of such an operation has not yet been determined. Arrangements for the preference capital have also to be considered. But should a merger be recommended, proposals would be put forward to shareholders of both companies as soon as possible. Yet many problems still need to be resolved and this will take some time.

Although few could have anticipated the possibility of a fusion between these important gold finance houses, a merger offers, perhaps, the most logical and profitable pattern for future development. For example Gold Fields has recently been preoccupied with the question of exploration and has set up organisations to further this object not only in Africa, but also in Canada and Australia. Large sums of money will be needed for these ventures, in which case Central Mining with its £2,000,000 liquid assets could be of considerable assistance.

Apart from general administrative savings other advantages of the merger would be a united West Wits Line and a closer technical association between Harmony and Saaiplaas Gold Mines in the Orange Free State. Besides this, with the likelihood of Central Mining's older Rand mines closing down in the near future, technical and other personnel would thus be released to the benefit of the new group.

Western Mining Corporation's Widespread Activities

Although Western Mining Corporation is energetically pursuing the task of proving for eventual exploitation varied mineral resources over a wide area in Australia, for the moment, the company remains largely interested in gold mining. And despite the ever-present problem of increasing labour costs—alleviated to some extent by Government subsidies and taxation exemption—the Corporation's activities in this field are profitable.

Ranking foremost amongst its revenue producers is a large holding in the Central Norseman Gold Corporation N.L., a rich mine which has been completely revitalized over the past few years. Another property which has the potential of becoming one of the largest gold producers in Australia, is Great Western Consolidated N.L. Broadly speaking this is a large scale low-grade operation which can be operated at reasonable cost. A further important investment is held in Gold Mines of Kalgoorlie (Australia) which in a comparatively short space of time has acquired a number of gold properties on the Kalgoorlie mining field. It is the policy of G.M.K. (Aust.) to concentrate the operations of these properties and subsequently to build them up into an efficient composite unit.

A review of W.M.C.'s interests in gold would not, however, be complete without a reference to the activities of Kalgoorlie Southern Gold Mining N.L. This company is carrying out a drilling programme through which it hopes to find an extension of the famous "Golden Mile". Results so far have been encouraging.

Year to Mar. 31	*Total Revenue* £A	*Expenses** £A	*Net Profit†* £A	*Dividends* £A	*To Reserve* £A	*Carry Forward* £A
1956	782,242	33,859	708,579	163,004	76,683	2,024,134
1955	695,482	35,310	605,262	139,718	50,481	2,025,801

* Administration and general.
† Including £A308,755 minority interests (1955—£A293,783).

During the past financial year W.M.C.'s main sources of revenue were again comprised of dividends from Central Norseman Gold Corporation and Gold Mines of Kalgoorlie (Australia). Dividend income at £A66,275 compared with only £A34,667 previously reflected an increased investment in the latter company.

Dividends on the Corporation's fully paid up capital of £A698,588 totalled 20 per cent and thus remained unchanged from those of 1954-1955. So far, an interim of 10 per cent has been paid in respect of the current financial year which would appear to imply a maintenance of total distribution. Should this be the case, W.M.C.'s 5s. shares at their present price of around 10s. 6d. would yield a useful 7¼ per cent.

As illustrated by the table below, W.M.C. has participations in potentially valuable enterprises outside gold mining. These include a search for uranium, lithium and oil. And it will no doubt, be with this aspect of the Corporation's operations particularly in mind that investors will examine the statement of the Chairman, Mr. G. Lindsey Clark, in respect of the past financial year to March 31, 1956, which is due to be issued shortly.

Meeting Melbourne, Australia, September 13.

Company and Fully Paid Capital	*W.M.C.'s direct Holdings*	%	*Year to March 31*	*Tons Milled*	*Grade (dwt.)*	*Yield (oz.)*	*Bullion Revenue§* £A	*Gold Premium* £A	*Taxation* £A	*Net Profit* £A	*Dividend* s. d.	*Carry Forward* £A
Central Norseman £A650,000 in 5s. shares	1,312,500	50	1956 1955	160,531 157,867	11.5 10.5	92,137 83,023	1,447,438 1,305,904	1,442 1,008	3,241 Nil	641,976 592,999	3 0 3 0	362,776 464,041
G.M.K. (Aust.) £A2,012,646 in 10s. stock	1,073,991	27	1956 1955	452,070*c* 199,950*c*	5.3*c* 5.6*c*	119,531*c* 55,603*c*	1,851,164 865,433	1,413 684	Nil 179	239,249 102,922	1 6 1 6	115,905 132,764
New Coolgardie (*f*)			1956 1955	— 66,201	— 10.4	— 34,342	— 535,412	— 419	— Nil	— 20,880	— Nil	— 268,830
Gt. Western Consol* £A1,768,000 in 10s. shares	500,000	14	1956 1955	452,740 421,144	2.9 2.7	66,006 56,792	1,031,897 885,217	977 723	Nil Nil	190,608 32,631	Nil Nil	207,400 16,792
Central Victoria Dredging £A390,000 in 10s. shares	395,500	50	1956 1955	1,149† 1,290†	2.0‡ 1.5‡	4,813 4,144	74,998 89,189	68 100	— 62	DR14,786 DR18,444	Nil Nil	106,769 129,337
Gold Mines of Australia (*a*) £A52,219 in 2s. 6d. shares	260,500	62	1956	Carrying out gold prospecting at Stawell, Victoria. Also prospecting for uranium in Queensland with W.M.C. In addition, participations taken in joint venture for Western Australian oil exploration.								
Victoria Gold Dredging £A9,000 in £1 shares (*b*)	110,600	44	1956	Ceased operations. Now holds 125,000 fully paid shares in Central Victoria Dredging.								
Kalgoorlie Southern £A185,225 in 5s. shares (*e*)	320,705*d*	22	1956	Company is testing areas south of the "Golden Mile" by diamond drilling for a repetition of the Kalgoorlie system of ore veins.								
Champagne Syndicate	52,000	100	1956	Holds leases of Mt. Charlotte (Kalgoorlie)								

* Production commenced November 1952. W.M.C. holds an option until June 13, 1961, to subscribe for 750,000 cos. 10s. shares at 5s. discount.
† Million cubic yards dredged.
‡ Grains of gold per cu. yd.
§ After realisation charges.
a Company acts as General Managers and Consultants to Central Victoria Dredging, Morning Star (G.M.A.) Mount Coolon Gold Mines and Victoria Gold Dredging.
b Also 241,000 £1 shares paid to 10s. only.
c Excluding tribute ore.
d Shareholdings comprise 154,240 fully paid 5s. shares and 166,465 shares of 5s. paid as to 2s.
e Also £37,045 shares of 5s. paid as to 1s.
f Company purchased by G.M.K. (Aust.) in October 1955. W.M.C. received 149,537 G.M.K. (Aust.) shares in exchange for its previous holding of 534,062 New Coolgardie shares.

Undertone in Kaffirs Remains Very Firm

Harder money rates in the U.S.A., together with uncertainties regarding the international situation were factors mainly responsible for the decline in the *Dow Jones Industrial Index* to 500.90 by August 29 from 507.06 on August 23. *Rails* lost 2.2 points to 160.01. Although trading on the London market remained exceptionally small, prices were firm and the *Financial Times Industrial Index* managed to gain 2.1 points to 186.4. But some weaknesses appeared on Thursday morning following Mr. Macmillan's warning about the economic situation. Broadly speaking, mining issues had a satisfactory week. Despite restricted trading the Kaffir market continued to show a strong technical position.

A major feature was the news of a possible merger between Gold Fields and Central Mining. Both these issues rose. The *Financial Times Gold Share Index* moved up to its highest point since the Suez crisis the marginal producers being assisted by renewed hopes of Government aid. Harmony improved on news that sinking of a new shaft would start shortly.

Coppers again behaved well in face of Wall Street declines. A feature was Rho-Kats which, after profit taking, touched a new peak of 45s. 6d. Bancroft were stronger on the news that American Depository Receipts had been arranged. Still under the influence of Consolidated Zinc's bauxite find, Australian lead/zincs made useful gains. Tins and platinum were generally steady and recorded some rises.

Central Provinces Maintains Interim

An interim dividend of 1s. 2d. free of tax (or 11¼ per cent) has been declared by Central Provinces Manganese Ore Company on its issued ordinary stock of £1,500,000 in units of 10s. This is the same interim as for the year ended December 31, 1954. Total distribution for 1954 amounted to 35 per cent tax free. Market conditions continue to be satisfactory, states the company, but railings so far this year have been disappointing.

Canadian Mines Handbook, 1956

For those interested in Canadian mining investments, the Canadian Mines Handbook, 1956, published by Northern Miner Press Ltd., 116 Richmond Street West, Toronto 1, Canada, is an indispensable reference work. Its price is $3 a copy, or $5 with de Luxe binding.

Some 8,154 companies are listed in one compact section and both format and type have been changed this year to permit easier reading and reference. As usual, the book provides all essential statistical data including directors, capitalization, production, and financial positions of the Canadian mining companies. Also included are the special sections "Metal Mines Classified" in which producers of each of the principal metals are listed. An eight-year range of mining share prices is given.

Indian Copper to Capitalize £457,100

As the present issued capital of India Copper Corporation does not adequately represent the actual asset position of the company, a sum of £457,100 is to be capitalized from general reserve account. Accordingly, a total of 4,571,000 shares of 2s. credited as fully paid will be allotted to shareholders in the proportion of one for every two units held.

In last week's issue of *The Mining Journal* we stated that this issue would reduce the company's net liquid asset position. As the operation is purely a book transaction the liquid position of the company will not, of course, be affected in any way and the comment was obviously incorrect. A total of about £2,000,000, therefore, remains available to assist Indian Copper to finance its prospecting work with a view to expanding production from new sources of ore.

Morning Star and Mount Coolon

Although Morning Star G.M.A. Mines and Mount Coolon Gold Mines do not figure in W.M.C.'s investment portfolio, the Corporation acts as general managers and consultants to

LONDON STOCK EXCHANGE PRICES — AUGUST 23 - AUGUST 29, 1956

Finance	Price Aug. 29	+ or — on week
African & European	3½	+⅛
Anglo American Corpn.	7⅝	—¼
Anglo-French	23/6	+9d
Anglo-Transvaal Consol.	1⅛	.....
Central Mining (£1 shrs.)	55/6	+2/3
Consolidated G'fields	60/-	+2/9
Consol. Mines Selection	1¾	.....
East Rand Consols	1/9	.....
General Mining	3⅛	—⅛
H.E. Prop.	9/-	—3d
Johnnies	39/-	+6d
Rand Mines	3⅛	.....
Rand Selection	1⅜	.....
Union Corporation	37/9	—3d
Vereeniging Estates	4⅛	+⅛
Writs	1⅜	—⅛
West Wits.	37/-	+6d
Rand Gold		
Blyvoors	22/3	—3d
Brakpan	6/4½	+7½d
Buffelsfontein	28/7½	+6d
City Deep	10/10½	+10½d
Consol. Main Reef	14/4½	+1/9
Crown	1⅞	+⅛
Daggas	2⅛	.....
Dominion Reefs	18/3	+1½d
Doornfontein	21/6	+3d
Durban Deep	1⅛	.....
E. Champs	3/-	—1½d
E. Daggas	9/6	.....
E. Geduld (4s. units)	28/-	—6d
E. Rand Props.	47/6	.....
Geduld	3¾	.....
Govt. Areas	3/9	+6d
Grootvlei	18/10½	+3d
Hartebeestfontein	39/4½	+6d
Libanon	7/3	+1½d
Luipards Vlei	13/-	+3d
Marievale	21/1½	+6d
New Kleinfontein	3/7½	+3d
New Pioneer	14/9	—1½d
Randfontein	38/9	+3d
Robinson Deep	9/3	+3d
Rose Deep	9/3	+6d
Simmer & Jack	3/7½	+1½d
S.A. Lands	1⅞	+⅛
Springs	2/7½	+1½d
Stilfontein	25/3	+6d
Sub Nigel	1⅛	+⅛
Vaal Reefs	31/7½	+7½d
Van Dyk	2/3	.....
Venterspost	14/1½	+4½d
Vlakfontein	17/1½	+3d
Vogelstruisbult	16/4½	—3d
West Driefontein	5⅛	—⅛
Rand Gold contd.		
W. Rand Consolidated	1⅜	.....
Western Reefs	28/4½	—3d
O.F.S. Gold		
Freddies	8/3	.....
Freddies Consolidated	4/-	—3d
F.S. Geduld	4⅜	—⅛
Geoffries	8/-	.....
Harmony	27/6	—3d
Loraine	6/-	—1½d
Lydenburg Estates	16/10½	+7½d
Merriespruit	7/9	.....
Middle Wits	11/9	—1½d
Ofsits	58/6	—6d
President Brand	2⅛	—⅛
President Steyn	33/7½	+4½d
St. Helena	29/-	—3d
Virginia Ord.	9/9	+1½d
Welkom	19/3	—6d
Western Holdings	3⅛	.....
West African Gold		
Amalgamated Banket	1/4½	—1½d
Ariston	3/10½	—1½d
Ashanti	15/-	.....
Bibiani	2/3	.....
Bremang	1/3	.....
G.C. Main Reef	1/7½	.....
Konongo	1/6	.....
Marlu	1¼d	.....
Taquah	1/9	+1½d
Western Selection	7/10½	—3d
Australian Gold		
Gold Mines of Kalgoorlie	13/9	.....
Great Boulder Prop.	11/3	+6d
Lake View & Star	17/-	+4½d
Mount Morgan	20/-	+3d
North Kalgurli	7/-	+3d
Sons of Gwalia	2/10½	.....
Western Mining	10/4½	.....
Miscellaneous Gold		
Cam & Motor	7/6	.....
Champion Reef	6/4½	.....
Falcon Mines	7/9	.....
Globe & Phoenix	23/9	.....
Motapa	10½d	.....
Mysore	3/6	—1½d
Nundydroog	9/4½	.....
St. John d'El Rey	33/6	+3d
Zams	2⅜	.....
Diamonds and Platinum		
Anglo American Inv.	8⅛	—⅛
Casts	25/1½	+3d
Cons. Diam. of S.W.A.	10/6	+3d
De Beers Defd. Regd.	5½	—⅛
De Beers Pfd. Regd.	13½	+½
Pots Platinum	14/1½	+10½d
Waterval	23/3	+1/9
Copper		
Bancroft	50/6	+9d
Chartered	72/3	—6d
Esperanza	3/4½	.....
Messina	8⅛	—⅛
Nchanga	13⅛	+⅛
Rhod. Anglo-American	5⅝	+⅛
Rhod. Katanga	44/9	+1/-
Rhodesian Selection	50/3	+6d
Rhokana	42½	+1d
Rio Tinto	4	+½
Roan Antelope	27/-	.....
Selection Trust	4½	—⅛
Tanks	7⅛	+⅛
Tharsis Sulphur Br.	4½	.....
Tin (Eastern)		
Ayer Hitam	20/3	—9d
Gopeng	9/6	—1½d
Hongkong	5/4½	.....
Ipoh	24/-	.....
Kamunting	9/-	+4½d
Kepong Dredging	3/3	.....
Kinta Tin Mines	15/-	.....
Malayan Dredging	10/1½	+1½d
Pahang	11/4½	+1½d
Pengkalen	13/4½	.....
Petaling	7/4½	—1½d
Rambutan	18/6	+7½d
Siamese Tin	10/-	+4½d
Southern Kinta	15/6	+6d
S. Malayan	7/1½	.....
S. Tronoh	5/6	.....
Sungei Kinta	14/3	+3d
Tekka Taiping	6/3	+3d
Tronoh	9/4½	+1½d
Tin (Nigerian and Miscellaneous)		
Amalgamated Tin	10/-	+1½d
Beralt Tin	49/-	—1/6
Bisichi	4/1½	.....
British Tin Inv.	21/1½	.....
Ex-Lands Nigeria	2/1½	+1½d
Geevor Tin	15/10½	.....
Tin (Nigerian and Miscellaneous) contd.		
Gold & Base Metal	1/1½	.....
Jantar Nigeria	4/6	+3
Jos Tin Area	12/3	.....
Kaduna Prospectors	1/6	.....
Kaduna Syndicate	2/3	.....
London Tin	9/3	+3d
United Tin	1/-	.....
Silver, Lead, Zinc		
Broken Hill South	62/6	+1/3
Burma Mines	4/3	.....
Consol. Zinc	58/9	+1/6
Lake George	14/-	+6d
Mount Isa	22/3	+1/10½
New Broken Hill	47/6	+2/3
North Broken Hill	99/6	+2/-
Rhodesian Broken Hill	11/-	—1½d
San Francisco Mines	26/-	+6d
Uruwira	4/6	—3d
Miscellaneous Base Metals and Coal		
Amal. Collieries of S.A.	51/-	+4½d
Associated Manganese	40/3	+1/9
Cape Asbestos	9/9	.....
C.P. Manganese	26/-	—9d
Consol. Murchison	2½	+⅛
Natal Navigation	3⅛	+⅛
Turner & Newall	105/10½	—4½d
Wankie	17/4½	+1½d
Witbank Colliery	5	—⅛
Canadian Mines		
Dome	$27	.....
Hollinger	$55	.....
Hudson Bay Mining	$168	+1
International Nickel	$202½	+1½
Mining Corpn. of Canada	£9½	.....
Noranda	$123	—½
Quemont	£10¾	—¼
Yukon	5/7½	+4½d
Oil		
Apex	43/9	+1/-
Attock	37/-	.....
British Petroleum	7⅛	—⅛
Burmah	91/6	—2/3
Canadian Eagle	65/-	+3d
Mexican Eagle	21/7½	+1½d
Shell	7½	+⅛
Trinidad Oil	79/3	.....
T.P.D.	49/3	—6d
Ultramar	41/7½	—1½d

these two companies. Mr. G. Lindsay Clark, the chairman, made some interesting comments on the underground position at Morning Star at the recent meeting on August 13. Ore reserves, he said, at March 31, 1956, estimated at 18,000 tons averaging 11.5 dwt. per ton, showed a sharp decline from 32,000 tons averaging 10.5 dwt. a year previously. Mr. Clark emphasized that practically no new ore had been developed since March and further production had reduced reserves to approximately 13,000 tons at 11.5 dwt. While reserves should thus supply 1,600 tons of ore per month to the mill over the next eight months, this period would be used to complete the major part of the company's development programme. If ore shoots were located—and it seems reasonable that they might be—ore from development would then supplement reserves.

At the meeting of Mount Coolon Mr. Clark reminded shareholders that the company's principal source of income had been dividends from Morning Star G.M.A. As no distribution had been received from this company during the financial year ended March 31, 1956, a loss of £892 has been sustained. Resumption of dividends, he said, depended upon the success of Morning Star's development programme.

Company Shorts

Modder "B" to Close.—Owing to the depletion of payable ore reserves it has been decided that mining operations at Modderfontein "B" Gold Mines will cease with effect from September 28. Thereafter, reclamation of material from underground and general clean-up operations will continue for some time. The company will, however, remain in existence for the purpose of turning to account its property and assets.

Success of Camp Bird Issue.—From the 1,377,331 shares of 10s. offered at par by Camp Bird on the basis of three for five, a total of 93.94 per cent were accepted. Applications for the 83,521 excess shares totalled 775,614. These shares have been allotted on a scale proportionate to applications.

Anglo Burma Tin Agreement Ratified.—At an extraordinary meeting held in London last week a provisional agreement entered into by Anglo Burma Tin Company with the President of the Union of Burma was approved and ratified by shareholders.

Mount Lyell's Nine Months' Profits.—Due to a change in its financial year end, operations by the Mount Lyell Railway and Mining Company during the past financial period covered nine months as compared with twelve months previously. Net profits totalled £A630,138 against £A808,231. This figure was struck after writing off prospecting and development expenditure of £A83,517 (£A28,077), depreciation of £A152,053 (£A167,806) and taxation of £A205,000 (£A317,000).

A final dividend of 1s. 5d. (Australian) per £1 stock (exempt from Commonwealth income tax) making a total of 12.083 per cent for the nine months—equivalent to 16.083 per cent for a full year, against 16¼ per cent—has been declared payable in Melbourne on October 20 from profits earned during nine months ended June 30, 1956.

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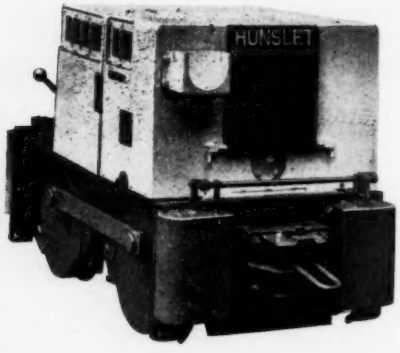

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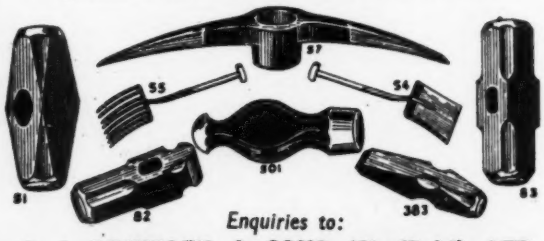

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